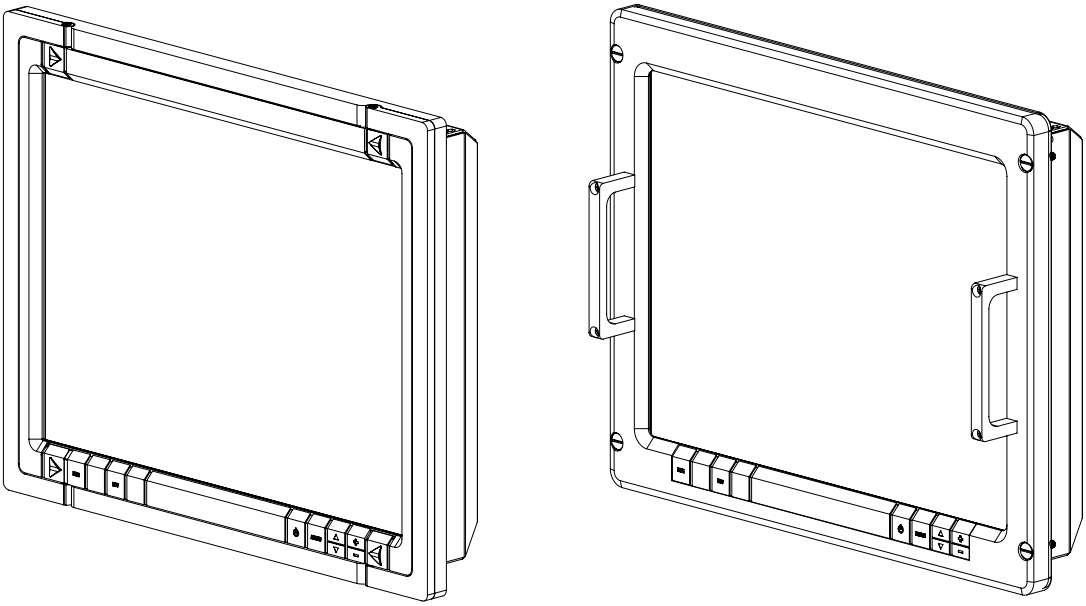
HATTELAND®
DISPLAY

USER MANUAL



Naval Multi Display Models

HM 20T07 NMD - 20.1 inch Naval Multi Display (NMD)
HM 20T07 CMD - 20.1 inch Combat Management Display (CMD)

User Manual NMD/CMD Series	
Updated: 29 Sep 2011	Doc Id: INB100034-1 (Rev 9)
Created: 363 Approved: 6987	

Please visit www.hatteland-display.com for the latest electronic version of this manual.

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WARNING: This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Contents

About this manual

The manual contains electrical, mechanical and input/output signal specifications. All specifications in this manual, due to manufacturing, new revisions and approvals, are subject to change without notice. The revision number and creation date of this manual are shown both on the frontpage and also in the “Revision History” chapter.

Contents **3**
- Contents of package 6

General **9**
- About this manual 10
- About Hatteland Display 10
- www.hatteland-display.com 10
- Contact Information 10
- Touchscreen Specifications & Drivers 11
- Product Labeling (examples) 12

Installation **13**
- Installation and mounting 14
- Ergonomics 14
  - *Cable Entries & Connectors (Marked area) - Illustration only 16*
  - *Maximum Cable Length 16*
  - *Handle Release & Console Mounting 17*
  - *EMI / Water Sealing Gasket (17 x 2 holes version) 18*
  - *EMI / Water Sealing Gasket (3 x 2 holes version) 19*
  - *Mounting Hole IP Gasket (16 x 2 plug version) 20*
- Physical Connections - HM 20T07 xxx 21

Operation **25**
- User Controls 26
- OSD Menu Overview 30
- OSD Menu Functions 31

Specifications **37**
- Specifications - HM 20T07 NMD 38
- Specifications - HM 20T07 CMD 39

Contents

Technical Drawings 41
Technical Drawings - HM 20T07 NMD 42
Technical Drawings - HM 20T07 CMD 43

Technical Drawings - Accessories 45
Technical Drawings - Gasket P005225-1 46
Technical Drawings - Mounting Hole IP Gasket P005222-1 47
Technical Drawings - Gasket P004503-1 48

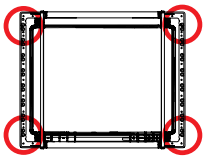
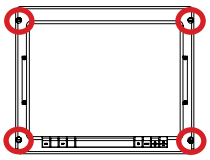
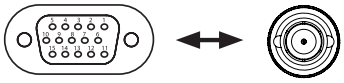
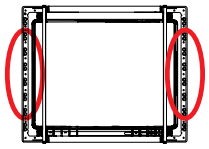
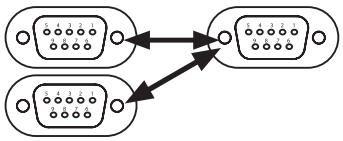
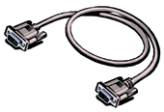
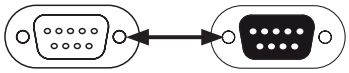
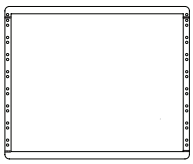
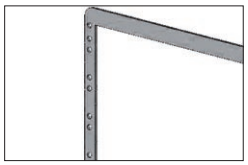
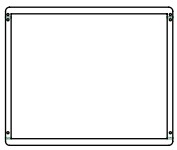
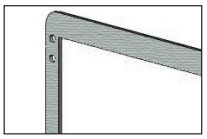
Appendixes 49
HATTELAND® SCOM Control Interface 50
Interface configuration 50
Electrical Interface 50
Comm settings 51
Factory Default Settings 51
Data Rate 52
Data Format 52
Message Format 52
Attention (ATTN) 52
Address (ADDR) 52
Command (CMD) 52
Data Length (LEN) 53
Inverse Header Checksum (IHCHK) 53
Data Field (DATA) 53
Inverse Data Checksum (IDCHK) 53
Message Commands 53
Brightness Command “BRT” 53
Manufacturer ID “MAN” 54
Unit ID Model/Version Number “VER” 54
Potentiometer control “POT” 54
Unit control command “MCC” 55
Unit Type/Model Number “TYP” 55
Operational Requirements 55
Initial and Default Unit Conditions 55
Serial Message Failure 56

Contents

Periodic Messages *56*
Fault Detection and Power Interruption Recovery *56*
Response Time *56*
Individually Addressed Command Response *56*
Elapsed Time Counter "ETC" *56*
Broadcast Command Response *57*
MCC Response *57*
Inter-message Gap *57*
Unit Response and Addresses *57*
Additional Commands *58*
Video Controller Interface Commands *59*
Revision History - HATTELAND® SCOM *66*
Pin Assignments 67
Basic Trouble-shooting 68
Declaration of Conformity 69
Return Of Goods Information 70
Terms 71
Pixel Defect Policy 73
Revision History 75

Contents of package

This product may be shipped with (NOTE: Configuration and model dependent):

Item	Description	Illustration
	4 x Cylindrical screw M6x25mm, DIN7984 / head diameter 10mm / head height 4mm / inside hex 4mm / A4 black Note: Suitable for use with the **NMD** models.	
 58-77-216-24	4 x Southco Captive Screw L=26mm Stainless Steel Black Modify 10 mm hex/w slot. Note: Suitable for use with the **CMD** models.	
 VSD100113-1	1 pcs of Standard BNC Signal Cable. 1 x DSUB 15P Male to 5 x BNC 5P Male - Length: 2.0m (6.5 ft)	
 P005222-1	2 pcs of Silicone plug band (16 pcs of plugs ecah) To provide drip-proof front frame. Mounted into the unused mounting holes behind the handles during installation. See installation chapter. Note: Only applicable for NMD models	
 VSD100641-1	1 pcs of Combined Serial/Touch custom cable. 2 x DSUB 9p Female to 1 x DSUB 9p Male - Length approx: 30cm (0.98 ft)	
 13750 es 100	1 pcs of Standard Serial Cable 1 x DSUB 9p Male to 1 x DSUB 9p Female - Length approx: 1.5m (4.9ft) *Note: -C7, -C8, -CF7, -CF8 models have 2 pcs of Standard Serial Cable.*	
 MEDIA STD01	1 pcs of Documentation and Driver DVD. Contains also suitable touch screen driver for units delivered with a factory mounted touch screen.	Menu and Driver browser for Microsoft® Windows®
 P005225-1	1 pcs of EMI / Water Sealing Gasket with 17 holes on each side. Comes with adhesive tape: 3M 9080-High Performance Non-woven Double Coated Tape. See installation chapter. Note: Only applicable for **NMD** models	
 P004503-1	1 pcs of EMI / Water Sealing Gasket with 6 holes on each side. Comes with adhesive tape: 3M 9080-High Performance Non-woven Double Coated Tape. See installation chapter. Note: Only applicable for **CMD** models.	
	1 pcs of factory Checklist sheet for the unit.	

Contents of package

Possible additional contents of package (if ordered separately):

ART NUMBER	DESCRIPTION
VSD100694-1	External 10-foot (3.0m) AC power cable NEMA (Halogen Free)
VSD100695-1	External 10 foot (3.0m) AC power cable Europe (Halogen Free)
VSD100696-1	External 10 foot (3.0m) DC power cable (Halogen Free)

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General

About this manual

The manual contains electrical, mechanical and input/output signal specifications. All specifications in this manual, due to manufacturing, new revisions and approvals, are subject to change without notice. However, the last update and revision of this manual are shown both on the frontpage and also in the “Revision History” chapter at the end of the manual.

Furthermore, for third party datasheet and user manuals, please see dedicated Documentation and Driver DVD delivered with the product or contact our sales/technical/helpdesk personnel for support.

About Hatteland Display

Hatteland Display is the leading technology provider of specialized display and computer products, delivering high quality, unique and customized solutions to the international maritime, naval and industrial markets.

The company represents innovation and quality to the system integrators world wide. Effective quality assurance and investment in sophisticated in-house manufacturing methods and facilities enable us to deliver Type Approved and Mil tested products. Our customer oriented approach, technical knowledge and dedication to R&D, makes us a trusted and preferred supplier of approved solutions, which are backed up by a strong service network.

www.hatteland-display.com

You will find our website full of useful information to help you make an informed choice as to the right product for your needs. You will find detailed product descriptions and specifications for the entire range on Displays, Computers and Panel Computers, Military solutions as well as the range of supporting accessories. The site carries a wealth of information regarding our product testing and approvals in addition to company contact information for our various offices around the world, the global service centers and the technical help desk, all ensuring the best possible support wherever you, or your vessel, may be in the world.

Contact Information

Head office, Vats / Norway: Hatteland Display AS Åmsosen N-5578 Nedre Vats, Norway Tel: +47 4814 2200 Fax: +47 5276 5444 mail@hatteland-display.com	**Sales office, Frankfurt / Germany:** Hatteland Display GmbH Werner Heisenberg Strasse 12, D-63263 Neu-Isenburg, Germany Tel: +49 6102 370 954 Fax: +49 6102 370 968
Sales office, Oslo / Norway: Solbråveien 20 N-1383 Asker Norway Tel: +47 4814 2200 Fax: +47 5276 5444	**Sales office, Aix-en-Provence / France:** Hatteland Display SAS 31 Parc du Golf, 350, Avenue JRGG de la Lauzière - CS 90519 13593 Aix-en-Provence Cedex 3, France Tel: +33 (0)4 42 16 35 15 Fax: +33 (0)4 42 16 35 09
Sales office, San Diego / USA: Hatteland Display Inc. 11440 W. Bernardo Court, Suite 300 San Diego, CA 92127, USA Tel: +1 858 753 1959 Fax: +1 858 430 2461	

For an up-2-date list, please visit www.hatteland-display.com/locations

Touchscreen Specifications & Drivers

Resistive Touchscreen

It generally uses a display overlay composed of layers, each with a conductive coating on the interior surface. Special separator “dots” are distributed evenly across the active area and separate the conductive interior layers.

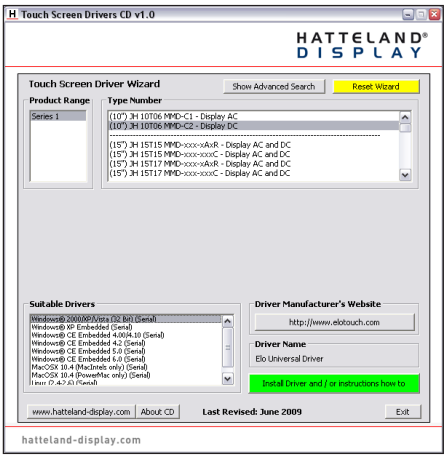
The pressure from using either a mechanical stylus or finger produces an internal electrical contact at the “action point” which supplies the controller with vertical and horizontal analog voltages for data input. The resistive touchscreens are anti-glare to reduce reflective shine intensity, which will slightly diffuse the light output throughout the screen. Resistive technology activation can be initiated by; a gloved hand, fingernail, mechanical stylus or an ungloved finger

Brief Specifications

Subject	Details
Positional Accuracy	1% average, 3% maximum Resolution Touchpoint density is based on controller resolution of 4096 x 4096.
Touch Activation Force	40 to 60 grams
Optical	**Light Transmission:** 75% Minimum
Chemical Resistance	Alcohols Dilute acids, Dilute alkalis Esters, Hydrocarbons Ketones, Household cleaning agents
Durability	1,000,000+ actuations for standard construction

Touch Screen Driver Installation

Touch Screen based products are shipped with a Touch Screen Driver Wizard Software (executable for Microsoft® Windows® based systems) available on the Documentation and Driver DVD media that follows the product. For other operating systems, let the OS scan the driver media for the appropriate driver.


Touch Screen Drivers CD v1.0
HATTELAND DISPLAY
Touch Screen Driver Wizard
Show Advanced Search
Reset Wizard
Product Range
Type Number
Series 1
(10") 3H 10T06 MMD-C1 - Display AC
(10") 3H 10T06 MMD-C2 - Display DC
(15") 3H 15T15 MMD-xxx-xAxR - Display AC and DC
(15") 3H 15T15 MMD-xxx-xxxC - Display AC and DC
(15") 3H 15T17 MMD-xxx-xAxR - Display AC and DC
(15") 3H 15T17 MMD-xxx-xxxC - Display AC and DC
Suitable Drivers
Windows® 2000/XP/Vista (32 Bit) (Serial)
Windows® XP Embedded (Serial)
Windows® CE Embedded 4.0/4.10 (Serial)
Windows® CE Embedded 4.2 (Serial)
Windows® CE Embedded 5.0 (Serial)
Windows® CE Embedded 6.0 (Serial)
MacOSX 10.4 (MacIntels only) (Serial)
MacOSX 10.4 (PowerMac only) (Serial)
Driver Manufacturer's Website
http://www.elotouch.com
Driver Name
Elo Universal Driver
Install Driver and / or instructions how to
www.hatteland-display.com
About CD
Last Revised: June 2009
Exit
hatteland-display.com

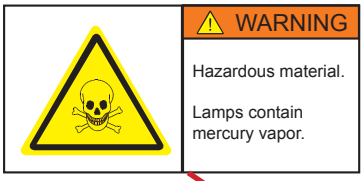
Select Product Range/TypeNumber of your model, and then finally the driver for the chosen operating system.

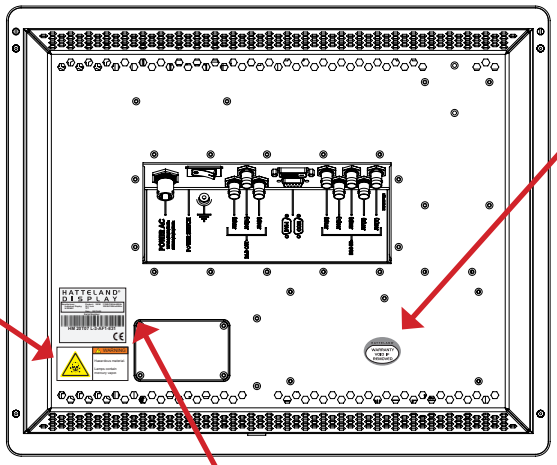
You can also visit our website www.hatteland-display.com to view the same list (or even recently new added products) of our models with touchscreen. Before using the touchscreen, it should be calibrated for your system. Please install the 3rd party software and use the Calibrate function from there.

For additional touch controller/screen documentation and updated drivers, please visit the 3rd party manufacturer site as found in the Touch Screen Wizard menu.

Product Labeling (examples)

Serial Number, Warranty and Warning label locations

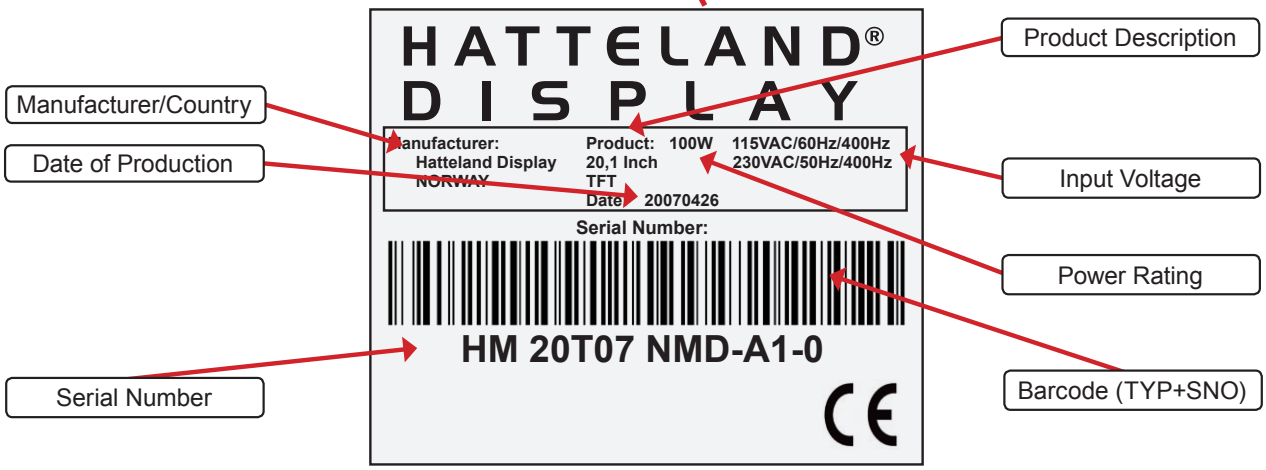




Warranty Label

If you are to perform service on a unit still under warranty, any warranty will be void if this label show signs of removal attempts (re-gluing) or removed completely.

This label is located on the back of the product and covers a key screw. This is to aid service departments to determine if there has been any unauthorized service on a unit still under warranty.



ID	PRODUCT TYPE NUMBER NOMENCLATURE EXAMPLE	Can contain other chars based on customer solutions?
HM	= Manufacturer Product Series ID	NO
20	= TFT Panel Size in inches ID	NO
T	= TFT Technology (Thin Film Transistor) ID	NO
0	= Internal PCB Electronics Revision ID	NO
7	= TFT Panel Generation ID	NO
NMD CMD	= Abbreviation Product Family ID (Naval Multi Display or Combat Management Display)	YES
A1	= Sub Hardware Revision ID (For a full overview, see specification datasheet or contact your provider)	YES
0	= Serial Number starting from 0 and increasing.	NO

Note: The table above is an example only for the label shown in this chapter.

Installation

General Installation Recommendations

Installation and mounting

1. Most of our products are intended for various methods of installation or mounting (panel mounting, bracket mounting, ceiling/wall mounting etc.); for details, please see the relevant mechanical drawings for panel cutout dimensions and product dimensions. For Panel/console installations, please use screws as specified in the Contents of Package chapter.

2. Adequate ventilation is a necessary prerequisite for the life of the product. The air inlet and outlet openings must definitely be kept clear; coverings which restrict ventilation are not permissible.

3. Do not install the unit in a horizontal position (laying down), as this will cause heat to build up inside the display which will damage the LCD Panel. To prevent this problem we recommend installing the unit in a vertical position (±40 degrees) to improve the airflow through the unit.

4. To further improve the cooling of the unit we recommend installing Cooling Fans underneath blowing upwards into the unit air inlet. This may be required in high temperature applications and also when there is reason to expect temperature problems due to non-optimal way of mounting.

5. Exposure to direct sunlight can cause a considerable increase in the temperature of the unit, and might under certain circumstances lead to overtemperature. This point should already be taken into consideration when the bridge equipment is being planned (sun shades, distance from the windows, ventilation, etc.)

6. Space necessary for ventilation, for cable inlets, for the operating procedures and for maintenance, must be provided.

7. Information about necessary pull-relievers for cables is given in the installation drawings. Attention must be paid to this information so that cable breaks will not occur, e.g. during service work.

8. Do not paint/re-paint the product. The surface treatment influences on the excess heat transfer. Painting, labels or other surface treatments that differ from the factory default might cause overheating.

9. Expose to heavy vibration and acoustic noise might under certain circumstances affect functionality and expected lifetime. This must be considered during system assembly and installation. Mounting position must carefully be selected to avoid any exposure of amplified vibration.

Ergonomics

1. Adjust the unit height so that the top of the screen is at or below eye level. Your eyes should look slightly downwards when viewing the middle of the screen.

2. Adjust screen inclination to remain gaze angle to the centre of the screen approximately perpendicular to the line of gaze.

3. When products are to be operated both from a sitting position and from a standing position, a screen inclination of about 30° to 40° (from a vertical plane) has turned out to be favourable.

4. Depending on solution, the units may be provided with optical bonding technology to reduce reflections and are viewable in direct sun light, but as a general rule the units at the bridge wing area is recommended to be installed or mounted by suitable alignment or bulkhead / deckhead mounting in such a way that reflections of light from the front pane of the display are not directed into the observer's viewing direction.

5. The use of ordinary commercial filter plates or filter films is not permitted for items of equipment that require approval (by optical effects, "aids" of that kind can suppress small radar targets, for example).

General mounting instructions

1: The useful life of the components of all Electronics Units generally decreases with increasing ambient temperature; it is therefore advisable to install such units in air-conditioned rooms. If there are no such facilities these rooms must at least be dry, adequately ventilated and kept at a suitable temperature.

2: This device is cooled by air flowing across the rear cover and air flowing through the ventilation holes. The cooling must not be impaired by partial covering of the unit or by installation of the unit in a confined cabinet.

3: Units which are to be used on the bridge wing must be installed inside the “wing control console” protected against the weather. In order to avoid misting of the viewing screen, a 25 ... 50 W console-heating (power depending on the volume) is recommended.

4: When selecting the site of a display unit, the maximum cable lengths have to be considered.

5: The impairment of read-out from a display screen by direct light from lamps or the sun must be avoided. Rear windows must be blacked out by means of roller blinds or Venetian blinds.

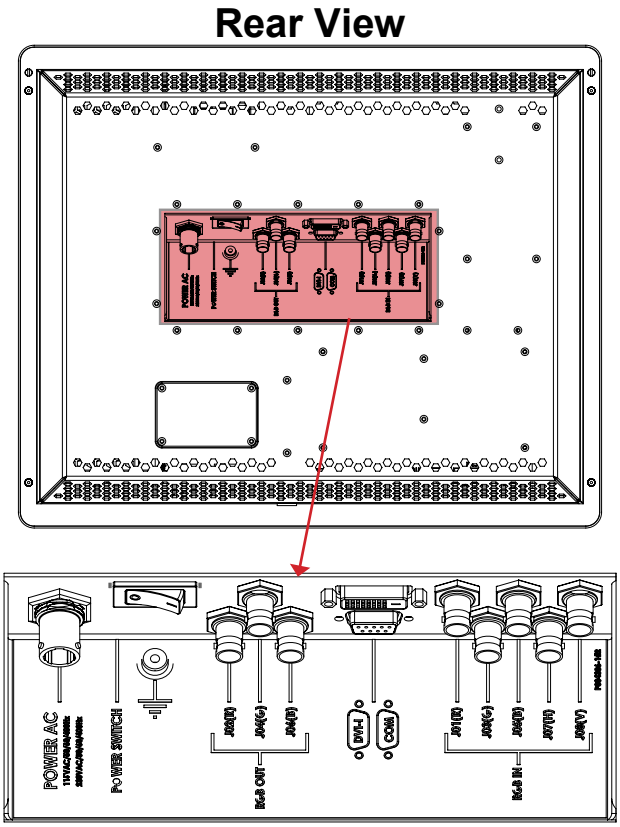
6: Disturbing reflections on the screen of a display caused by pilot lamps and illuminated signs must be prevented by suitable measures (screening or relocating).

7: When a product is being installed, the surface base or bulkhead must be checked to ensure that it is flat in order to avoid twisting of the unit when the fixing screws are tightened, because such twisting would impair mechanical functions. Any unevenness should be compensated for by means of spacing-washers.

8 Transportation damage, even if apparently insignificant at first glance, must immediately be examined and be reported to the freight carrier. The moment of setting-to-work of the equipment is too late, not only for reporting the damage but also for the supply of replacements.

9. The classification is only valid for approved mounting brackets provided by Hatteland Display. The unit shall be mounted stand-alone without any devices or loose parts placed at or nearby the unit. Any other type of mounting might require test and re-classification.

Cable Entries & Connectors (Marked area) - Illustration only



AC Model illustrated. Explanations for the connectors is available in the “Physical Connections” chapter in this manual.

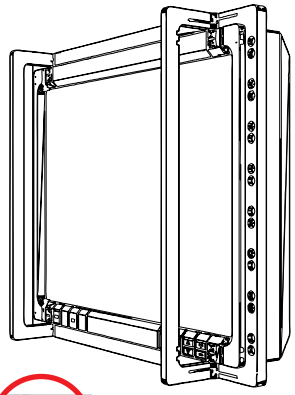
Maximum Cable Length

The RGB/DVI cable should generally be kept as short as possible to provide a high quality output on the display. The maximum cable length will depend on the signal resolution and frequency, but also on the quality of the signal output from the computer. Recommended is 60Hz vertical frequency.

Cables up to 10 meters generally provides good picture quality even with a 1600x1200 (UXGA) 60Hz signal. In most cases (especially with lower resolutions) even longer cables will provide a satisfactory result. This should however be tested prior to installation to determine the most suitable distance between signal source and display unit.

Handle Release & Console Mounting

The NMD unit features two handles which makes console installation and de-installation easier. These handles are locked by spring mounted pins at the top and bottom of the unit on each handle. To release the handles from its locking position and mount the unit, review the quick guide below.



1: With your thumbs on the upper and lower reliever pads (FIG 1), press and push forward simultaneously until the handle is released. Apply the same procedure to the left and right side of the unit. (FIG 2).

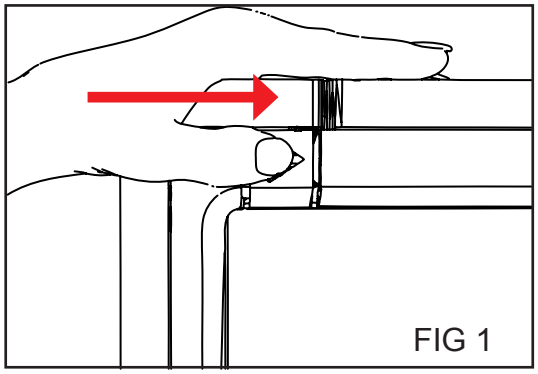


FIG 1

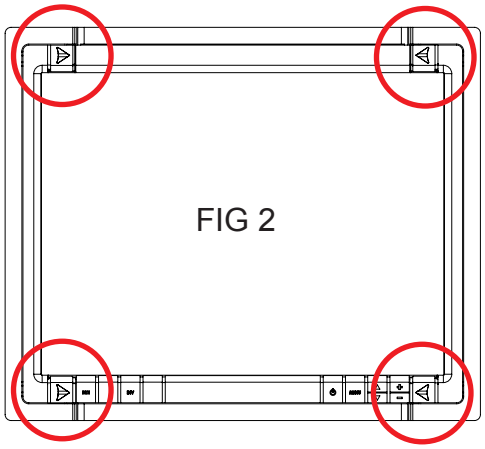
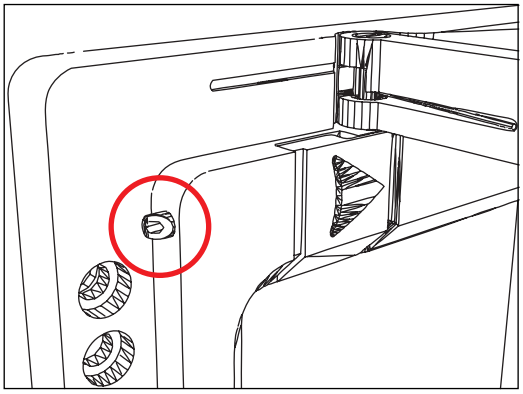
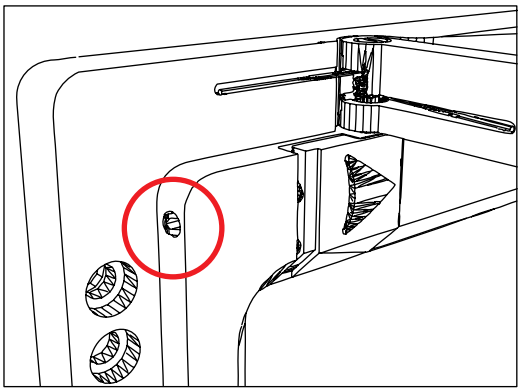


FIG 2

2: Observe that the handles are locked in place by the spring mounted locking pin which retracts into the frame when the reliever pad is pushed to the left or right.





3: FIG 3 shows the units mounting holes. The NMD supports a wide range of mounting possibilites for your console needs. Use minimum 4 screws to fasten it, preferably one in each corner. The unit is fasten from the front. Please use the specificed screws as described in the Content of Package chapter.

After mounting, push the handles back into the frame. You will hear a clicking sound which ensures that the handles have been properly locked.

Additionally, you may use the “Mounting Hole IP Gasket” to make the front frame drip-proof.

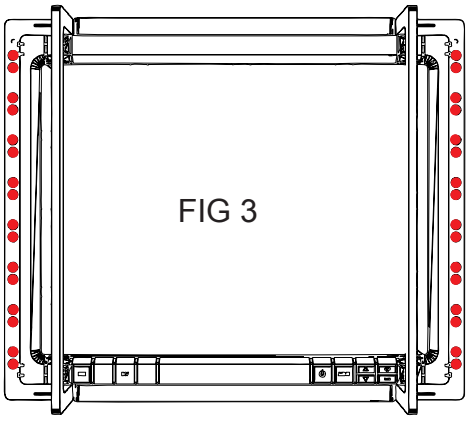


FIG 3

EMI / Water Sealing Gasket (17 x 2 holes version)

This gasket is only applicable for NMD models. Comes with adhesive tape: 3M 9080-High Performance Non-woven Double Coated Tape.

To mount it correctly, please review the quick guide below.

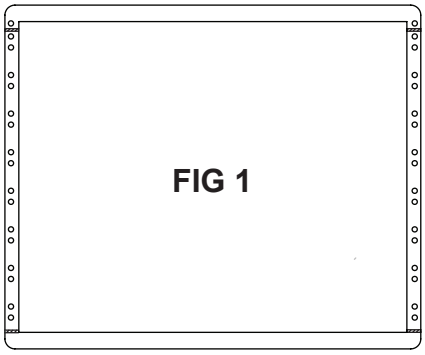


FIG 1

1: Clean the bright surface with isopropanol as red area in FIG 2 shows.

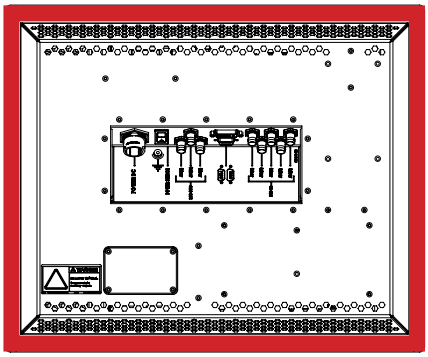


FIG 2

2: Remove the protection paper from the gasket (FIG 1).

3: Now mount the gasket to the unit as shown in FIG 3.

Make sure that the holes in the gasket fits the guide pins (on each side/top) and that it aligns with the holes in the mounting frame.

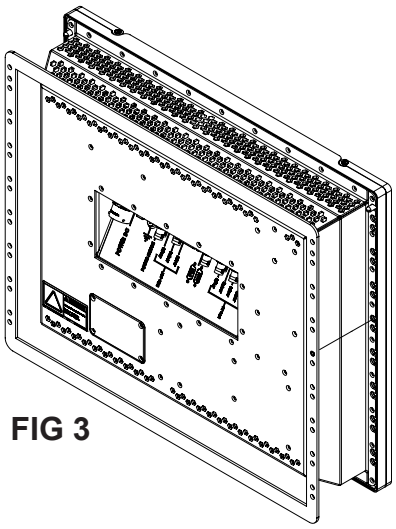


FIG 3

4: Press firmly with two fingers around on the entire gasket (FIG 4) to make sure it is glued properly and that possible air bubbles are not present underneath the gasket.

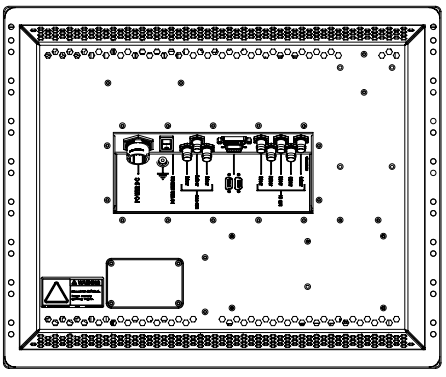


FIG 4

EMI / Water Sealing Gasket (3 x 2 holes version)

This gasket comes with adhesive tape:
3M 9080-High Performance Non-woven Double Coated Tape.

To mount it correctly, please review the quick guide below.

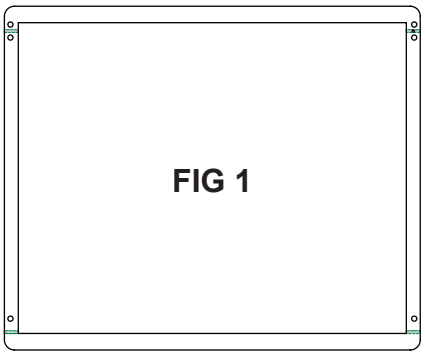


FIG 1

1: Clean the bright surface with isopropanol as red area in FIG 2 shows.

2: Remove the protection paper from the gasket (FIG 1).

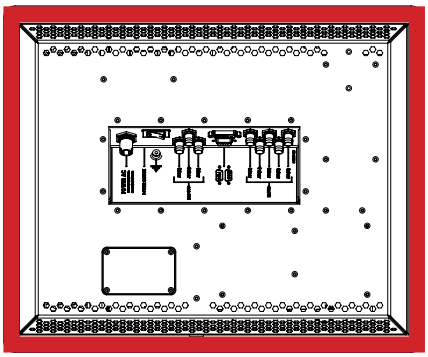


FIG 2

3: Now mount the gasket to the unit as shown in FIG 3.

Make sure that the holes in the gasket fits the guide pins (on each side/top) and that it aligns with the holes in the mounting frame.

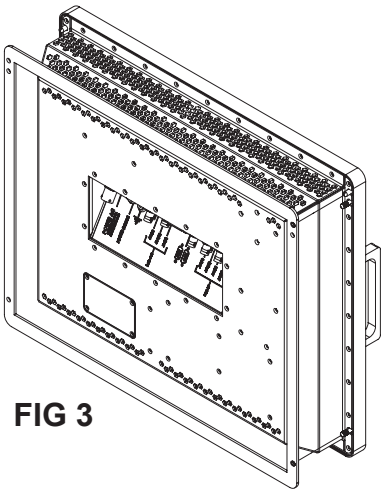


FIG 3

4: Press firmly with two fingers around on the entire gasket (FIG 4) to make sure it is glued properly and that possible air bubbles are not present underneath the gasket.

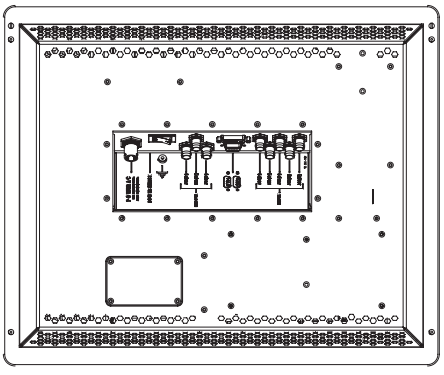


FIG 4

General Installation Recommendations

Mounting Hole IP Gasket (16 x 2 plug version)

This gasket (FIG 1) is only applicable for NMD models.

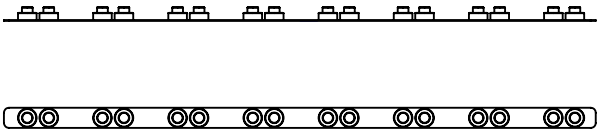


FIG 1

It provides drip-proof front frame. Mounted into the unused mounting holes behind the handles during installation.

To mount it correctly, please review the quick guide below.

1: After the product has been mounted into a console or similar with screws, leave the handles released as FIG 2 shows.

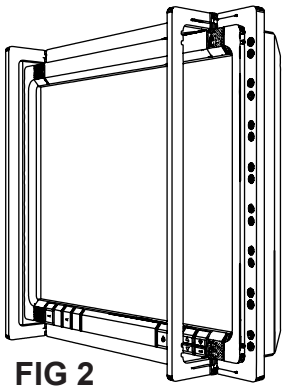


FIG 2

2: The gasket is mounted where the red area in FIG 3 shows.

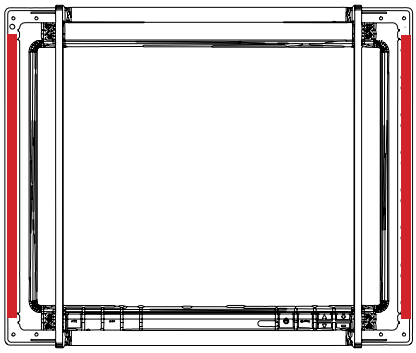


FIG 3

3: Insert the gasket into the holes (FIG 4).

4: Close the handles (FIG 5)

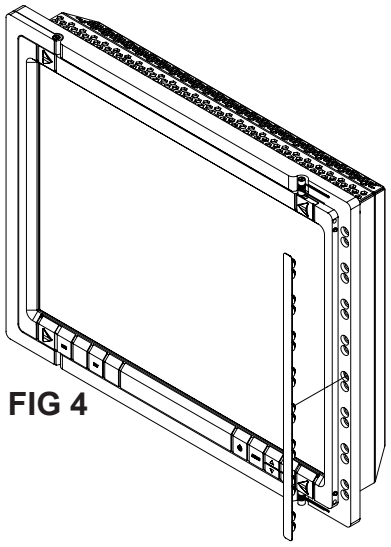


FIG 4

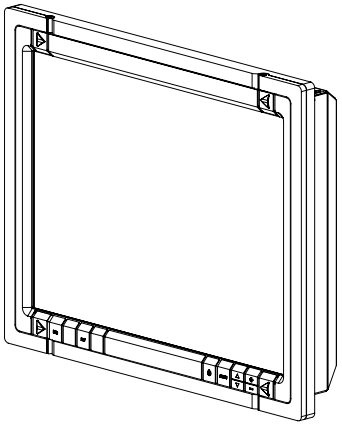
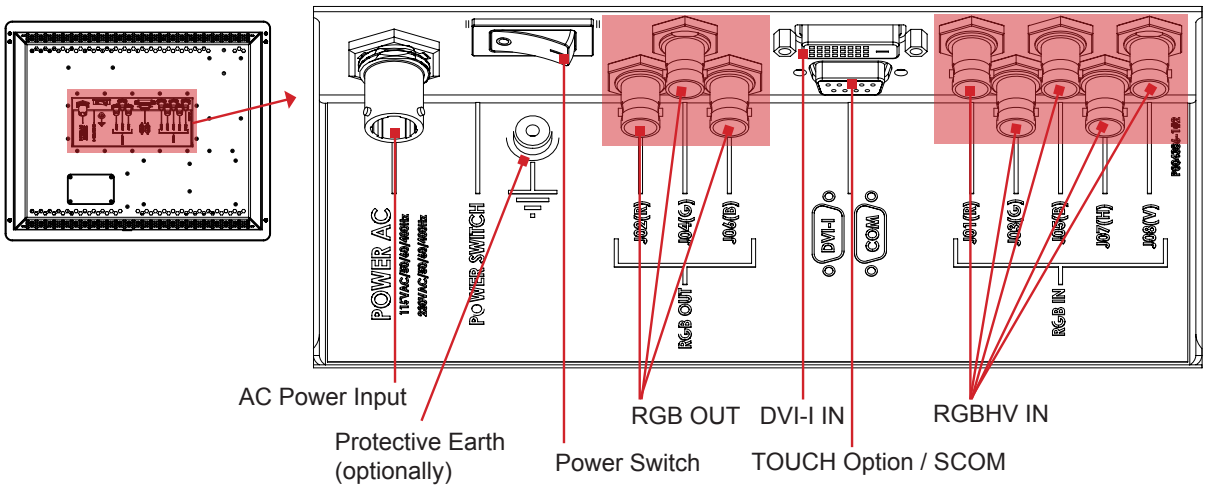
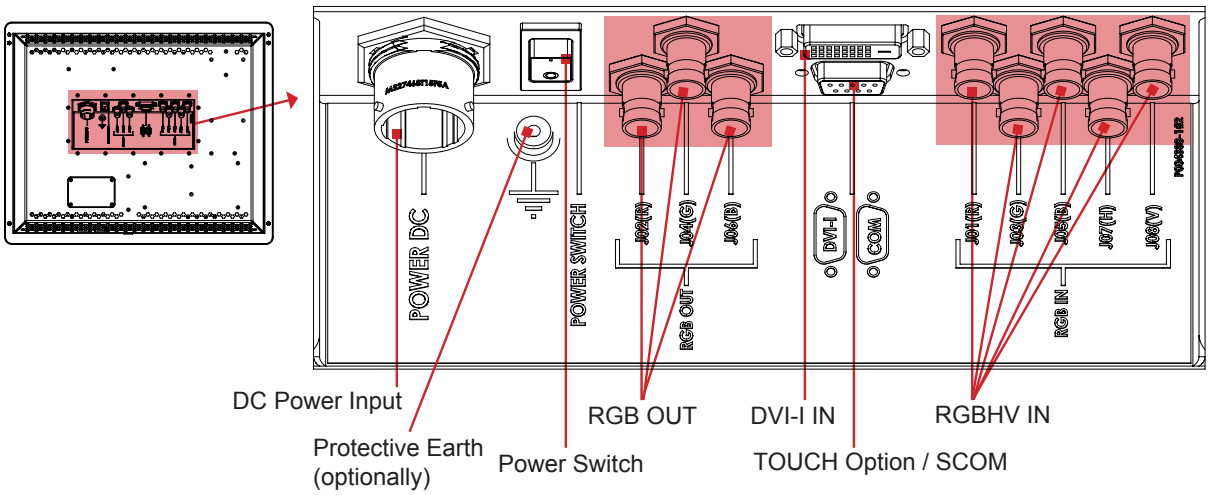


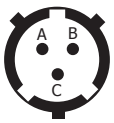
FIG 5

Rear connection area - AC models



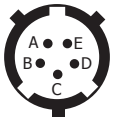
Rear connection area - DC models





AC POWER INPUT: (Circular MIL connector) - For AC models only

If your terminal label is marked “POWER AC”: The internal AC power module supports both 115VAC/50/60/400Hz and 230/50/60/400Hz power input. Connect your appropriate power cable and make sure the connector is firmly fasten. For pinouts, see PIN ASSIGNMENTS chapter.

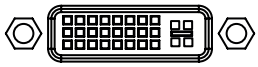


DC POWER INPUT: (Circular MIL connector) - For DC models only

If your terminal label is marked “POWER DC”: The internal DC power module supports 24/28VDC power input. Connect your appropriate power cable and make sure the connector is firmly fasten. For pinouts, see PIN ASSIGNMENTS chapter.

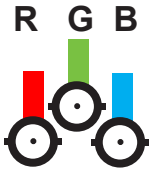
MAIN POWER TOGGLE SWITCH:

For AC models the main power toggle switch provide secure 100% power off which means no physical/electrical connection between power input and power module is possible. This differ from the soft-power on/off button on the front of the product which only sends a electronic remote power switch signal to the internal power electronics.
For DC models, the switch act as a single pole power switch, thus only disconnecting power and not cutting both power lines. When connecting / disconnecting any cables, please make sure to set the switch to 0 (off).



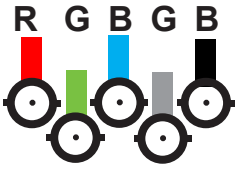
DVI-I IN:

Connect your DVI cable to the DVI-I 29P Connector (female). Fasten the DVI cable to the connector and make sure you don't bend any of the pins inside the connector when connecting. The DVI-I connector can function as regular RGB IN by using a DVI-I -> RGB/VGA cable. For pinouts, see PIN ASSIGNMENTS chapter.



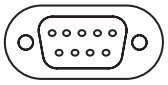
RGB OUT: (RGB - Circular BNC connectors)

This will enable a clone image output of the picture being displayed on the unit via the RGB IN. Connect your BNC cable to the 3 x BNC Connectors (female) and connect the opposite to your equipment. Make sure the connectors is firmly fasten and that you do not switch around the separate signals/colors for: R(to red color cable),
G(to green color cable) and B(to blue color cable). Note: RGB output is only suitable for use with RGB Sync on Green signals.



RGB IN: (RGBHV - Circular BNC connectors)

Connect your BNC cable to the 5 x BNC Connectors (female) connect the opposite to your equipment. Make sure the connectors is firmly fasten and that you do not switch around the separate signal/colors for: R(to red color cable),
G(to green color cable), B(to blue color cable) H(to horizonal sync gray color cable) and V(to vertical sync black color cable).



TOUCH SCREEN (optional) & SCOM / BIT Interface:

The connector provides dual functionality for Touch Screen and SCOM/BIT interface. The relevant touch screen pins are unconnected for non-touch screen models. There are different approaches to utilize this connector. They are:

1: For TOUCH SCREEN & SCOM usage simultanously, the provided VSD100641-1 cable designed for HM 20T07 models must be used. A commercial standard RS232 cable will not work!

2: For SCOM usage ONLY, the VSD100641-1 cable designed for HM 20T07 models must be used.

3: For TOUCH SCREEN usage ONLY, a commercial standard RS232 cable will work (no need to use the VSD100641-1 cable)

TOUCH SCREEN:

Connect your cable to the D-SUB 9P Connector (female) on the rear side of the unit. Connect the other end to your COM port of your computer. Install the nesscessary software needed to operate it. Fasten it using the regular mounting screws on the cable itself and make sure you don’t bend any of the pins inside the connector when connecting.

SCOM/BIT Interface:

The serial remote control connector (RS232) for controlling backlight and display parameters.
Connect the combined serial/touch cable (VSD100641-1) to the D-SUB 9P Connector (female) on the rear side of the unit. Connect a standard serial cable to the SCOM/BIT connector on the combined serial/touch cable and connect the other end to the COM port of your computer. For simultaneous use of SCOM/BIT and Touchscreen interfaces use the other connector on the combined serial/touch cable. For extended documentation on usage, refer to the appendix in this manual.

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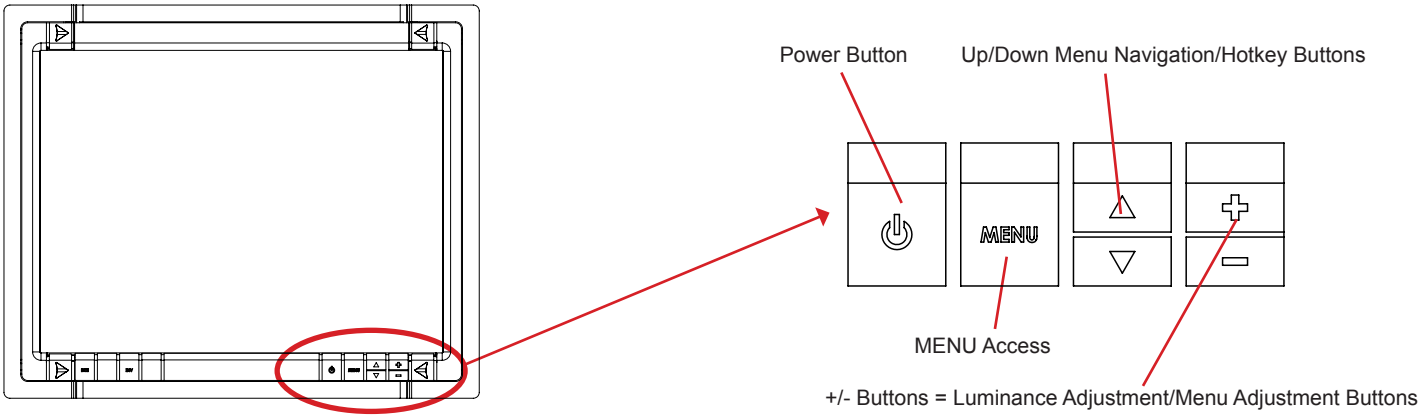
Operation

User Controls

START-UP:

The unit features a Instant-ON / Delay-OFF functionality, which ensures that it is not turned off by user accident. The location is on the right bottom side of the unit together with the other user controls as illustrated below. Note that all symbols are illuminated from behind as a white/yellowish dimmed color. Ensure that the power switch at rear is set to the ON position first.



Power ON: To turn the unit on, press down the power button and release it when the symbols are illuminated.
Power OFF: To turn the unit off, press and hold the power button down for 3 seconds. All illuminated symbols will be turned off.

BACKLIGHT LUMINANCE ADJUSTMENT:

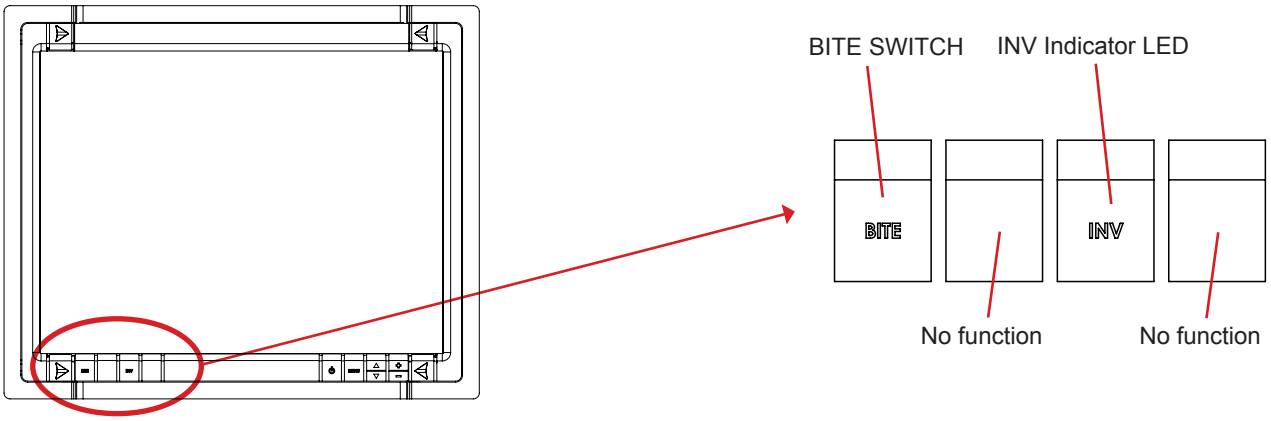
The unit features a 100% dimmable image, which means it is capable of displaying a completely black image when BRIGHTNESS is adjusted fully down to 0%. Also, all the illuminated symbols will fade accordingly based on the brightness adjustments.

ASSIGNABLE HOT KEYS:

The user can assign various display functions as hot keys. This will enable the user to quickly adjust the brightness, image size, contrast or other functions to control the image. To assign these hot keys, enter the **"UTILITIES MENU / DIRECT ACCESS"** menu and change them to the desired hot key function. The hot-key function is only applicable for the "UP/DOWN" buttons.

EXTENDED FUNCTIONALITY:

The unit features a BITE function button and INV Indicator LED.



BITE SWITCH:

The test picture is designed to easily discover image errors in the unit. When the BITE button is pressed and held down for a couple of seconds, the unit will display a test picture and perform an extended self test. The test picture is displayed for 10 seconds, during which time the display will be unresponsive to other signal sources and key presses.

(Note: If MENU button is pressed the test picture will disappear, but the unit will still be unresponsive for the remaining test cycle).

The image is generated internally in the display controller, and does not rely on any other external signal sources. The brightness of the panel is automatically adjusted to 100% during the test and will reset back to its initial value as defined before the test was initiated. The results of the last extended self test is stored in the unit. If there are image defects in the test pattern, these are generated in the display itself, and are not affected by any other signal inputs.

To exit from the test sequence after its 10 second test cycle, press the MENU button.

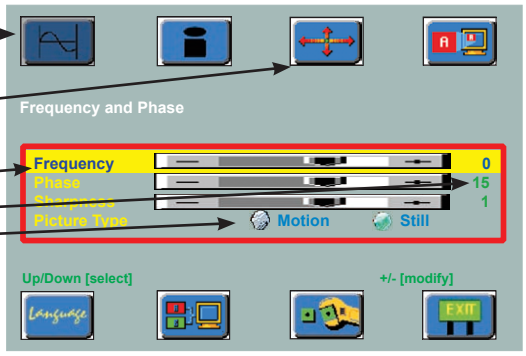
INV INDICATOR:

The INV led indicator alarm will only illuminate red when there is a problem with the backlight control logic which means that it uses a fault segmented backlight system where parts of the system can fail witout causing critical degrading of the performance of the display. If there is a critical error in the backlight driver the maximum light output will be cut in half and the display will be slightly darker in the upper or lower section. Since the human eye have a very non-linear response to light, this can be difficult to see.

USER CONTROLS:

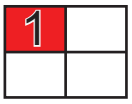
The On Screen Display (OSD menu) controls are located in the right bottom side of the unit. To begin understanding the workflow of the menu, follow these steps for a quick start.

1: Press the “MENU” button. The OSD menu will show all the available functions you can adjust or control.
2: You can move to the next icon by pressing “MENU”.
3: Select options within icon menu by pressing “UP” or “DOWN” buttons. The selected option will turn yellow.
4: Use “+” or “-” buttons to increase/decrease values.
5: Move the selection left or right by using “+” or “-” buttons. The selected option will turn green.
6: To confirm the selection, press “+” button.
To abort press “-” button.

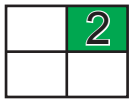


OSD MENU - Introduction:

The On Screen Display (OSD menu) contains several functions that will let the user to adjust or setup the display to their preferred setting. There are two variants of the OSD MENU, one is for regular use and one is for Advanced use.The functions are shown as easy understandable icons. Some of the menus have sub-menus. The OSD menu consists of 2 modes: (Icon beside function indicates if it’s available in that mode). RGB/DVI MODE = When RGB/DVI signal (i.e OS or radar / charts) are displayed full screen.



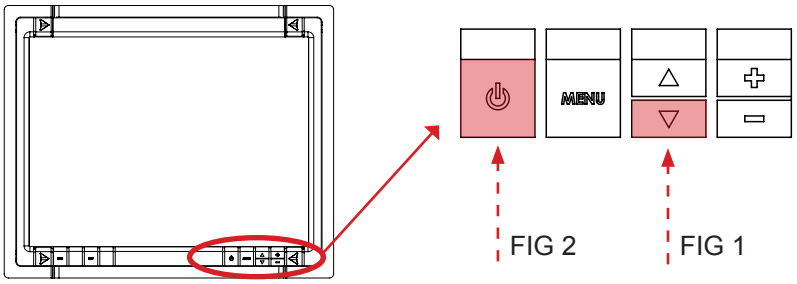
Mode 1 - Available functions in **RGB / DVI* MODE Simplified OSD Menu**
User can adjust the most common functions needed to operate the display.
**Some functions are not available in DVI mode.*



Mode 2 - Available functions in **RGB / DVI* MODE Advanced OSD Menu**
User can access more advanced functions. (Service menu).
**Some functions are not available in DVI mode.*

OSD MENU - Advanced:

To access the “Advanced/Full” OSD Menu, please do the following 4 steps:



1: Make sure the unit is powered off.
2: Now, press and hold down the “DOWN ARROW” (FIG1) button while also pressing the power button (FIG2).
3: After the input signal appears on the screen, release both the power button and “DOWN ARROW” button.
4: Now, press MENU and you should have access to more advanced functions of the OSD MENU.

WARNING !! ONLY A QUALIFIED SERVICE ENGINEER SHOULD ACCESS THE ADVANCED/SERVICE MENU. PERFORMANCE OF THE DISPLAY MAY BE SERIOUSLY AFFECTED!

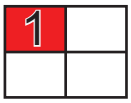
OSD MENU - NOTICE!

PLEASE NOTE that the video controller software are based on a standarized factory firmware which include functionality for VIDEO SIGNALS. The HM 20T07 models does not have any video inputs physically, so references or functions explained in this chapter regarding COMPOSITE, VIDEO, S-VHS, S-VIDEO and PIP (Picture In Picture) does NOT apply for the HM 20T07 models.

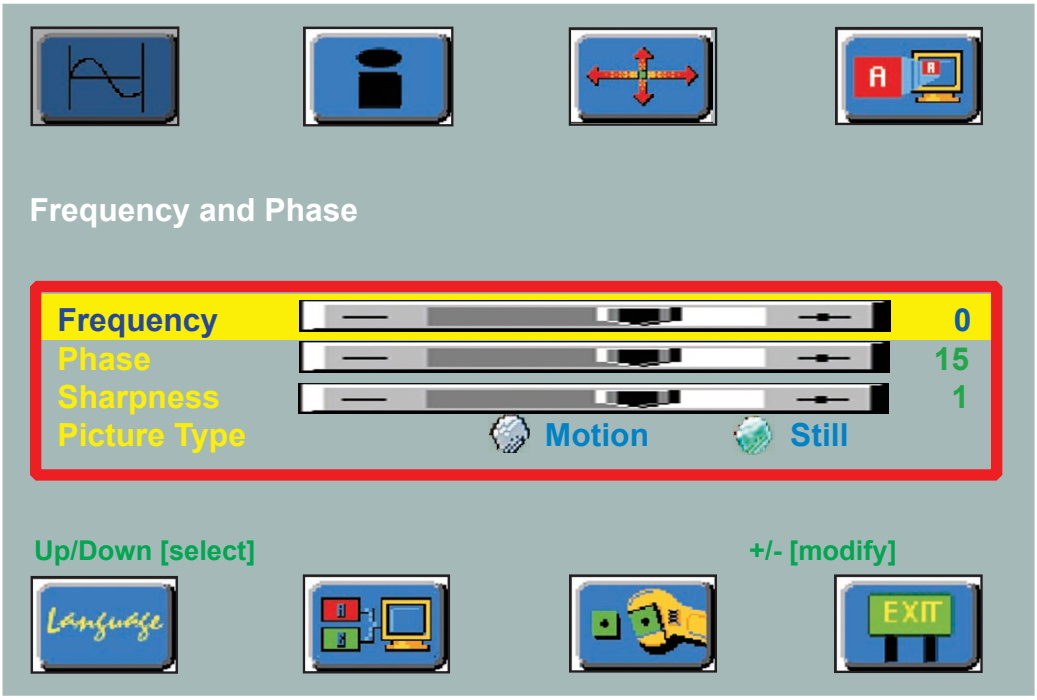
Please ignore references to VIDEO functionality in the On Screen Display menu and in this chapter.

OSD Menu Overview

Mode 1 - Function layout in **RGB / DVI MODE Simplified/Normal OSD Menu: (User menu)**

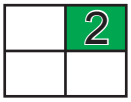


Note that to be in RGB / DVI MODE, a computer signal must be present in full screen, i.e Windows or other operating system/radar system.

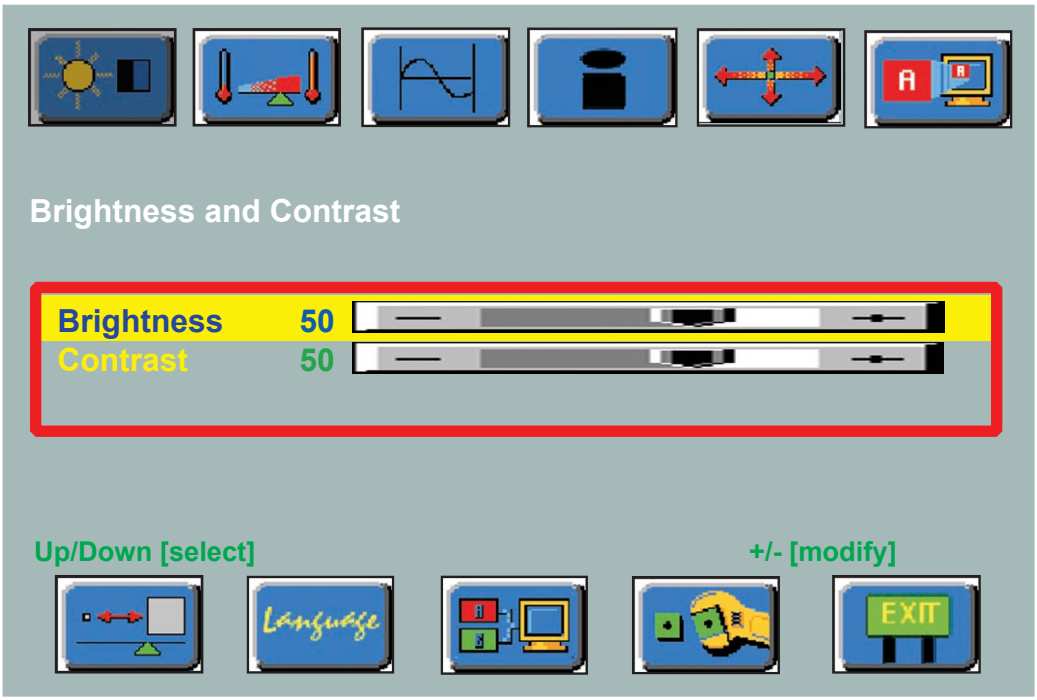


Please note: Illustration only! Icons/text may deviate from actual OSD menu on your product due to different OSD software revisions.

Mode 2 - Function layout in **RGB / DVI MODE Advanced/Full OSD Menu: (Service menu)**

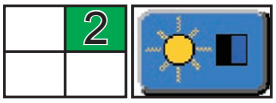


Note that to be in RGB / DVI MODE, a computer signal must be present in full screen, i.e Windows or other operating system/radar system.



Please note: Illustration only! Icons/text may deviate from actual OSD menu on your product due to different OSD software revisions.

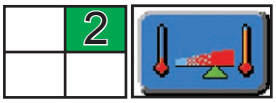
OSD Menu Functions



BRIGHTNESS AND CONTRAST: (No function for DVI signals)
Selecting this function will enable the user to adjust brightness and contrast for the display.

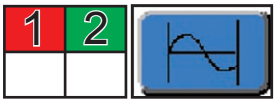
(No Function for DVI) BRIGHTNESS: Increase/decrease brightness level, total: 100 steps
(No Function for DVI) CONTRAST: Increase/decrease contrast level, total: 100 steps

---



COLOR TEMPERATURE:
Selecting this function will enable the user to modify the warmness of the picture. Higher temperature = "cooler" picture. Lower temperature = "warmer" picture.

User can select between *9500K, 8000K, 6500K,* and *5000K* color temperature measured in Kelvin degrees. Press "+" to access the sub-menu, where the RGB values can be adjusted. Use "+" and "-" buttons to adjust these values, and "MENU" to exit. (Saving is done automatically)

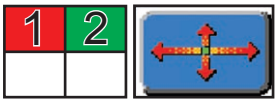


FREQUENCY AND PHASE: (Some functions not available for DVI signals)
Selecting this function will enable the user to modify the image horizontal size and fine tune the image quality.

(No Function for DVI) FREQUENCY: Increase/decrease the image horizontal size.
(No Function for DVI) PHASE: Fine tune the data sampling position (adjust image quality.)
(No Function for DVI) SHARPNESS: Increase/decrease video image sharpness level.

PICTURE TYPE : Motion / Still (Adjustment for best image quality)
If graphics on screen move a lot, select "Motion"
If graphics on screen are mostly still, select "Still"

STATUS:
Selecting this function will display graphic information such as resolution and frequency.



POSITION: (No function for DVI signals)
Selecting this function will enable the user to position the image within the display area.

(No Function for DVI) IMAGE UP/DOWN : Position the image vertically using "UP" or "DOWN" buttons.
(No Function for DVI) IMAGE LEFT/RIGHT : Position the image horizontally using "+" or "-" buttons.

PICTURE IN PICTURE: (Function not implemented in HM 20T07 models)
Selecting this function will enable the user to configure PIP window size, input signal source, horizontal and vertical position and more.

PIP SIZE : Select PIP window size. Adjustable in steps 0 (off) to 24.
PIP SOURCE : Select video source to be displayed in PIP window.

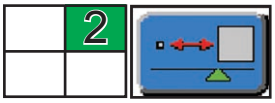
Available sources are:

AUTO = automatic detection of Composite or S-Video.
COMPOSITE = manual select composite video signal only.
SVIDEO = manual select S-Video signal only.

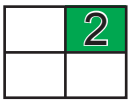
HORIZONTAL POSITION: Adjust the position of the PIP window horizontally.
VERTICAL POSITION: Adjust the position of the PIP window vertically.

ADVANCED SETTINGS: (Click to enter sub-menu)

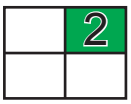
BRIGHTNESS: Increase/decrease the image brightness of the PIP window.
CONTRAST: Increase/decrease the image contrast of the PIP window.
SHARPNESS: Increase/decrease the image sharpness of the PIP window.
TINT: Increase/decrease the tint of the image of the PIP window.
COLOR: Increase/decrease the color of the image of the PIP window.



GRAPHIC SCALING MODES: (No function for DVI signals)
Selecting this function will enable the user to configure the graphic scaling of the RGB/DVI or VIDEO image. The change will happen realtime.
Note: Some of these functions will impact on image quality, and will therefore not show the optimal 1:1 picture with correct aspect ratio and resolution suitable for the TFT module.

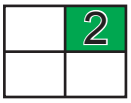


Scaling methods in PC/DVI MODE: ONE TO ONE, FILL SCREEN, FILL TO ASPECT RATIO, NONLINEAR SCALING MODES

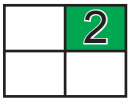


ONE TO ONE: (Press "+" to access the sub-menu)

HORIZONTAL PAN: Increase/decrease the horizontal pan.
VERTICAL PAN: Increase/decrease the vertical pan.



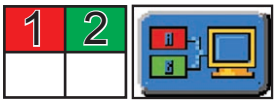
FILL SCREEN : Enable full screen expansion for lower resolution image.
FILL TO ASPECT RATIO : Enable full screen expansion for lower resolution image according to aspect ratio.



NONLINEAR SCALING MODES: (Press "+" to access the sub-menu)
Will either clip the image off (to black), or stretch/scale the image . This will impact on image quality, and will therefore not show the optimal 1:1 picture with correct aspect ratio and resolution suitable for the TFT module.

HORIZONTAL CLIPPING: Increase/decrease the horizontal clipping.
HORIZONTAL OFFSET: Increase/decrease the horizontal offset.
HORIZONTAL STRETCH: Increase/decrease the horizontal stretch.
VERTICAL CLIPPING: Increase/decrease the vertical clipping.
VERTICAL OFFSET: Increase/decrease the vertical offset.
VERTICAL STRETCH: Increase/decrease the vertical stretch.

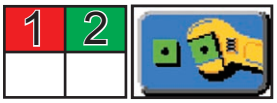
LANGUAGE:
Available languages are: English, Norwegian, Chinese and French. This will affect all text and messages in the OSD menus.



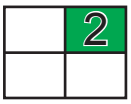
VIDEO SOURCE: (Composite & S-Video not implemented for HM 20T07 models)
Selecting this function will enable the user to select the type of input signal to show fullscreen. Available inputs are: Analog RGB1, Analog RGB2, DVI, Composite Video, and S-Video. The display unit will switch signal source instantly, so if no signal source is present (physically connected) the image will be black for 1-2 seconds before it resets back to the previous detected signal.

Note: This function will only behave as described if the Utilities/Auto Source Select is set to "High". Factory default is "Off"

OSD Menu Functions

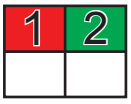


UTILITIES:
Selecting this function will enable the user to configure the OSD menu, define hot keys, verify BIOS Firmware version and miscellaneous operations.



USER SETTING: (Press "+" to access the sub-menu)

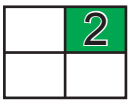
DPMS	: Disable / Enable the DPMS function.
DISPLAY INPUT	: Disable / Enable input source name upon power up.
AUTO SOURCE SELECT	: Off = Disable auto source select function. (Default setting) Low = Auto source select enabled ONLY in power up. High = Auto source select ALWAYS enabled.
FILTER	: Auto/On/Off - Signal Noise Reduction for Analog RGB1 Signal. *(Only available/functioning on custom models where required)*
GAMMA	: 1.0 / 1.6 / 2.2 - Adjusts gamma on TFT display.
SERIAL ADRESS	: Set Serial Remote Channel from 0 to 15. *(Consult "Serial Communication (SCOM) Interface" chapter appendix)*



OSD SETTING: (Press "+" to access the sub-menu)

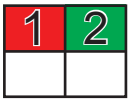
OSD HORZ POSITION: Position the OSD menu horizontally.
OSD VERT POSITION: Position the OSD menu vertically.

OSD BACKGROUND	: Choose between Translucent or Opaque (Default).
OSD ROTATE	: Choose between Normal / Rotate. Will position the menu either horizontally or vertically.
OSD MODE	; Only available in Advanced/Full menu! "NORMAL" = ALWAYS shows the Simplified version of the OSD menu. Company logo will be shown (top left corner). "TOGGLE" = ALWAYS show the Advanced/Full version of the OSD menu. Company logo will NOT be shown (top left corner). *(Please refer to the beginning of this chapter for information)*
USER TIME OUT	: Adjust the OSD menu time out period in a step of 5 seconds.



ZOOM: (Press "+" to access the sub-menu)

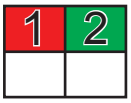
ZOOM LEVEL: Zooms in the display area from center.
HORIZONTAL PAN: Pan the display area horizontally.
VERTICAL PAN: Pan the display area vertically.



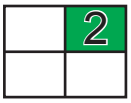
DIRECT ACCESS 1: (Press "+" to access the sub-menu)
Note: Some choices may not be available on all HM 20T07 models!
Define the hot key function for ("UP" or "DOWN" buttons) to one of these OSD functions:
Brightness / Contrast / Video Source / PIP* / No Function / Test Pattern / Rig for Black
** By pressing the hot-keys, the sequence of the selected input video source are:*
Analog RGB1 / Analog RGB2 / DVI / Composite Video / S-Video.

NOTE: *When assigning video source to hot key function, please set the "AUTO SOURCE SELECT" to HIGH (see above).*
NOTE: *Direct Access 1 default factory setting is NO FUNCTION*

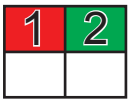
OSD Menu Functions



CALIBRATE RGB GAIN : Color Calibration. Press “+” to automatically adjust it.

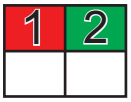


DISPLAY ORIENTATION: (Press “+” to access the sub-menu)
Will flip/inverse the display area. Press “+” to choose between:
Normal / Horizontal Inverse / Vertical Inverse / Inverse

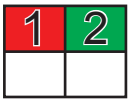


LOAD (FACTORY) DEFAULTS: (Press “+” to access the sub-menu).

LOAD USER DEFAULT	: Load your own personal custom settings.
SAVE USER DEFAULT	: Save your own personal custom settings.
LOAD FACTORY DEFAULT	: Will reset the graphic controller settings to the factory preset. Use caution when using this function, as this will override your current settings.
SETUP DDC	: Reset/optimize image information. This function will setup correct DDC (Display Data Channel) information. It allows the display module to send its specifications to the display controller. This information is used by the OSD menu.

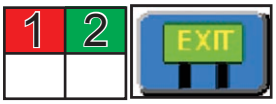


TEST PATTERN : Shows a generic test pattern.



RIG FOR BLACK
- Please note that this function may not be available on all HM 20T07 models!

: Makes the display rigged for a black environment.
This means that the function will lower the brightness to be ranged from 0 to 11fL.



EXIT MENU:
Selecting this function will exit the OSD menu.
Press “+” to exit and save the current settings.

Note:
The OSD settings will also automatically be stored in memory when the OSD exit on user timeout.

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Specifications

Specifications - HM 20T07 NMD

Note: All specifications are subject to change without prior notice!

Technical Description:

TFT Technology:
- High Quality SHARP® TFT
- 20.1" viewable image size
- a-Si TFT (Thin Film Transistor) Active Matrix
- Optical Bonding Technology

TFT Characteristics:
- Native Resolution : 1600 x 1200
- Pixel Pitch (RGB) : 0.255 (H) x 0.255 (V) mm
- Response Time : 20 ms (typical), rise + fall
- Contrast Ratio : 500:1 (typical)
- Light Intensity : 250 cd/m2 (typical)
- Viewable Angle : +/- 88° (typical) (Up/Down/Left/Right)
- Active Display Area : 408.0 (H) x 306.0 (V) mm
- Max Colors : 16.7 million

Synchronization:
- Digital separate synchronization
- Composite synchronization
- Synchronization on green
- Auto detects VGA -> UXGA, interlaced and non interlaced
- Video Signal : Analog RGB 0,7Vp-p- Input Impedance 75Ω
- Horizontal : 15.0 kHz to 75 kHz
- Vertical : 56 Hz* to 75 Hz

Resolutions:
- VGA : 640 x 480 (including 640 x 350)
- SVGA : 800 x 600 (including 720 x 400)
- XGA : 1024 x 768
- SXGA : 1280 x 1024
- UXGA : 1600 x 1200*

** Recommended in 60Hz for optimal picture quality. 56 Hz only in 800x600*

Power Supply Options:
- 115VAC/50/60/400Hz & 230VAC/50/60/400Hz - A1/C7 models
- 24/28 VDC - A2/C8 models

Power Specifications
- Power Consumption: Operating 75W (typical) - 100W (max)
- Inrush Current: 10A for 24/28VDC, Max. (@ 25 deg. C)
- Inrush Current: 10A for 115VAC, Max. (@ 25 deg. C)

Environmental Performance:

TEST	LEVEL	SPECIFICATION
Dry heat storage	70 deg. C	Mil-Std-810F
Cold storage	-40 deg. C	Mil-Std-810F
Operating Temperature (typ)	AC Model: -15 to +55 deg. C DC Model: -15 to +55 deg. C	Mil-Std-810F
Humidity	95% at 40 deg. C	Mil-Std-810F
Shock	60g / 11ms	IEC 60068-2-27 (1987), Test Ea
Grade A Shock	Class I (hard-mounted)	MIL-S-901D
Transient Shock	2-280 Hz Designed to envelope a half sine shock pulse of 50g / 35ms	IEC 60068-2-57 (1999-11), Test Ff
Rain (drip proof)	-	MIL-STD-810F *
Salt Fog	-	MIL-STD-810F
Vibration Testing	-	MIL-STD-167-1

** Console mounted.*

Mechanical Description:

Physical Dimensions:
- 482.00 (W) x 399.00 (9U) (H) x 95.00 (D) mm
- 18.98" (W) x 15.71" (9U) (H) x 3.74" (D)
- Weight: 11.5 kg

I/O Signal Terminals Rear:
- DVI-I Signal IN : 1 x 29p DVI-I (or as RGB IN with adapter)
- RGB Signal IN : 5 x BNC J01(R)+J03(G)+J05(B)+J07(H)+J08(V)
- RGB Signal OUT : 3 x BNC J02(R)+J04(G)+J06(B)
- If AC Power IN : 1 x Circular MIL P/N: AMP - MS27468T9F98P
- If DC Power IN : 1 x Circular MIL P/N: AMP - MS27468T15F5P
- Grounding : 1 x M4 Internal Screw Thread
- Combined Touch / SCOM+BIT Interface: 1 x 9p D-SUB (female)

User Controls / On front bezel:
- BIT Function button
- INV Alarm Indicator LED
- Power ON/OFF button
- On Screen Display control (OSD/OSM) button
- Up/Down OSD Navigation / Hotkey Set #1 buttons
- +/- Brightness Control
- All buttons have backlighting

User Controls / Rear:
- Mains Power ON/OFF Toggle Switch

EMI Testing:

The unit is tested according to the following:
MIL-STD 461E, 1999

- CE 101 - Conducted emission, 30 Hz - 10 kHz
- CE 102 - Conducted emissions, 10 kHz - 10 Mhz
- CS 101 - Conducted susceptibility, 30 Hz - 50 kHz
- CS 114 - Conducted susceptibility, 10 kHz - 200 MHz
- CS 116 - Conducted susceptibility, damped oscillatory waves
- RE 101 - Radiated emission, H-field, 30 Hz - 100 kHz
- RE 102 - Radiated emissions, E-field, 10 kHz - 10 GHz
- RS 101 - Radiated susceptibility, H-field, 30 Hz - 100 kHz
- RS 103 - Radiated susceptibility, E-field, 2 MHz - 18 GHz

Factory Mounted Options:

- Resistive Touch Screen (8 wire)
- Color Calibrated models (ECDIS)

Typical Type Numbers:

- HM 20T07 NMD-A1 = AC Power
- HM 20T07 NMD-A2 = DC Power
- HM 20T07 NMD-C7 = AC Power + Resistive Touch Screen
- HM 20T07 NMD-C8 = DC Power + Resistive Touch Screen

NSN (NATO Stock Number): 7025-01-576-3091

Available Accessories:

- VSD100694-1 = External 10-foot (3.0m) AC power cable NEMA (Halogen Free)
- VSD100695-1 = External 10 foot (3.0m) AC power cable Europe (Halogen Free)
- VSD100696-1 = External 10 foot (3.0m) DC power cable (Halogen Free)

TESTING/APPROVALS & CERTIFICATES

This product have been tested / type approved by the following classification societies:

MIL-STD 461E, 1999 **MIL-S-901D Class I (hard-mounted) Grade A Shock**
EN60945 4th (IEC945 4th) **IACS E10**

Specifications - HM 20T07 CMD

Note: All specifications are subject to change without prior notice!

Technical Description:

TFT Technology:
- High Quality SHARP® TFT
- 20.1" viewable image size
- a-Si TFT (Thin Film Transistor) Active Matrix
- Optical Bonding Technology

TFT Characteristics:
- Native Resolution : 1600 x 1200
- Pixel Pitch (RGB) : 0.255 (H) x 0.255 (V) mm
- Response Time : 20 ms (typical), rise + fall
- Contrast Ratio : 500:1 (typical)
- Light Intensity : 250 cd/m2 (typical)
- Viewable Angle : +/- 88° (typical) (Up/Down/Left/Right)
- Active Display Area : 408.0 (H) x 306.0 (V) mm
- Max Colors : 16.7 million

Synchronisation:
- Digital separate synchronization
- Composite synchronization
- Synchronization on green
- Auto detects VGA -> UXGA, interlaced and non interlaced
- Video Signal : Analog RGB 0,7Vp-p- Input Impedance 75Ω
- Horizontal : 15.0 kHz to 91 kHz
- Vertical : 56 Hz* to 75 Hz

Resolutions:
- VGA : 640 x 480 (including 640 x 350)
- SVGA : 800 x 600 (including 720 x 400)
- XGA : 1024 x 768
- SXGA : 1280 x 1024
- UXGA : 1600 x 1200*

** Recommended in 60Hz for optimal picture quality. 56 Hz only in 800x600*

Power Supply Options:
- 115VAC/50/60/400Hz & 230VAC/50/60/400Hz - A1/C7 models
- 24/28 VDC - A2/C8 models

Power Specifications
- Power Consumption: Operating 75W (typical) - 100W (max)
- Inrush Current: 10A for 24/28VDC, Max. (@ 25 deg. C)
- Inrush Current: 10A for 115VAC, Max. (@ 25 deg. C)

Environmental Performance:

TEST	LEVEL	SPECIFICATION
Dry heat storage	70 deg. C	Mil-Std-810F
Cold storage	-40 deg. C	Mil-Std-810F
Operating Temperature (typ)	AC Model: -15 to +55 deg. C DC Model: -15 to +55 deg. C	Mil-Std-810F
Humidity	95% at 40 deg. C	Mil-Std-810F
Shock	60g / 11ms	IEC 60068-2-27 (1987), Test Ea
Grade A Shock	Class I (hard-mounted)	MIL-S-901D
Transient Shock	2-280 Hz Designed to envelope a half sine shock pulse of 50g / 35ms	IEC 60068-2-57 (1999-11), Test Ff
Rain (drip proof)	-	MIL-STD-810F *
Salt Fog	-	MIL-STD-810F
Vibration Testing	-	MIL-STD-167-1

** Console mounted.*

Mechanical Description:

Physical Dimensions:
- 482.00 (W) x 399.00 (9U) (H) x 135.00 (D) mm
- 18.98" (W) x 15.71" (9U) (H) x 5.31" (D)
- Weight: 11.5 kg

I/O Signal Terminals Rear:
- DVI-I Signal IN : 1 x 29p DVI-I (or as RGB IN with adapter)
- RGB Signal IN : 5 x BNC J01(R)+J03(G)+J05(B)+J07(H)+J08(V)
- RGB Signal OUT : 3 x BNC J02(R)+J04(G)+J06(B)
- If AC Power IN : 1 x Circular MIL P/N: AMP - MS27468T9F98P
- If DC Power IN : 1 x Circular MIL P/N: AMP - MS27468T15F5P
- Grounding : 1 x M4 Internal Screw Thread
- Combined Touch / SCOM+BIT Interface: 1 x 9p D-SUB (female)

User Controls / On front bezel:
- BIT Function button
- INV Alarm Indicator LED
- Power ON/OFF button
- On Screen Display control (OSD/OSM) button
- Up/Down OSD Navigation / Hotkey Set #1 buttons
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- All buttons have backlighting

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- Mains Power ON/OFF Toggle Switch

EMI Testing:

The unit is tested according to the following:
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- CE 101 - Conducted emission, 30 Hz - 10 kHz
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- CS 114 - Conducted susceptibility, 10 kHz - 200 MHz
- CS 116 - Conducted susceptibility, damped oscillatory waves
- RE 101 - Radiated emission, H-field, 30 Hz - 100 kHz
- RE 102 - Radiated emissions, E-field, 10 kHz - 10 GHz
- RS 101 - Radiated susceptibility, H-field, 30 Hz - 100 kHz
- RS 103 - Radiated susceptibility, E-field, 2 MHz - 18 GHz

Factory Mounted Options:

- Resistive Touch Screen (8 wire)
- Color Calibrated models (ECDIS)

Typical Type Numbers:

- HM 20T07 CMD-A1 = AC Power
- HM 20T07 CMD-A2 = DC Power
- HM 20T07 CMD-C7 = AC Power + Resistive Touch Screen
- HM 20T07 CMD-C8 = DC Power + Resistive Touch Screen

NSN (NATO Stock Number): 7025-25-160-4382

Available Accessories:

- VSD100694-1 = External 10-foot (3.0m) AC power cable NEMA (Halogen Free)
- VSD100695-1 = External 10 foot (3.0m) AC power cable Europe (Halogen Free)
- VSD100696-1 = External 10 foot (3.0m) DC power cable (Halogen Free)

APPROVALS & CERTIFICATES

This product have been tested / type approved by the following classification societies:

EN60945 4th (IEC945 4th) **MIL-STD 461E, 1999**

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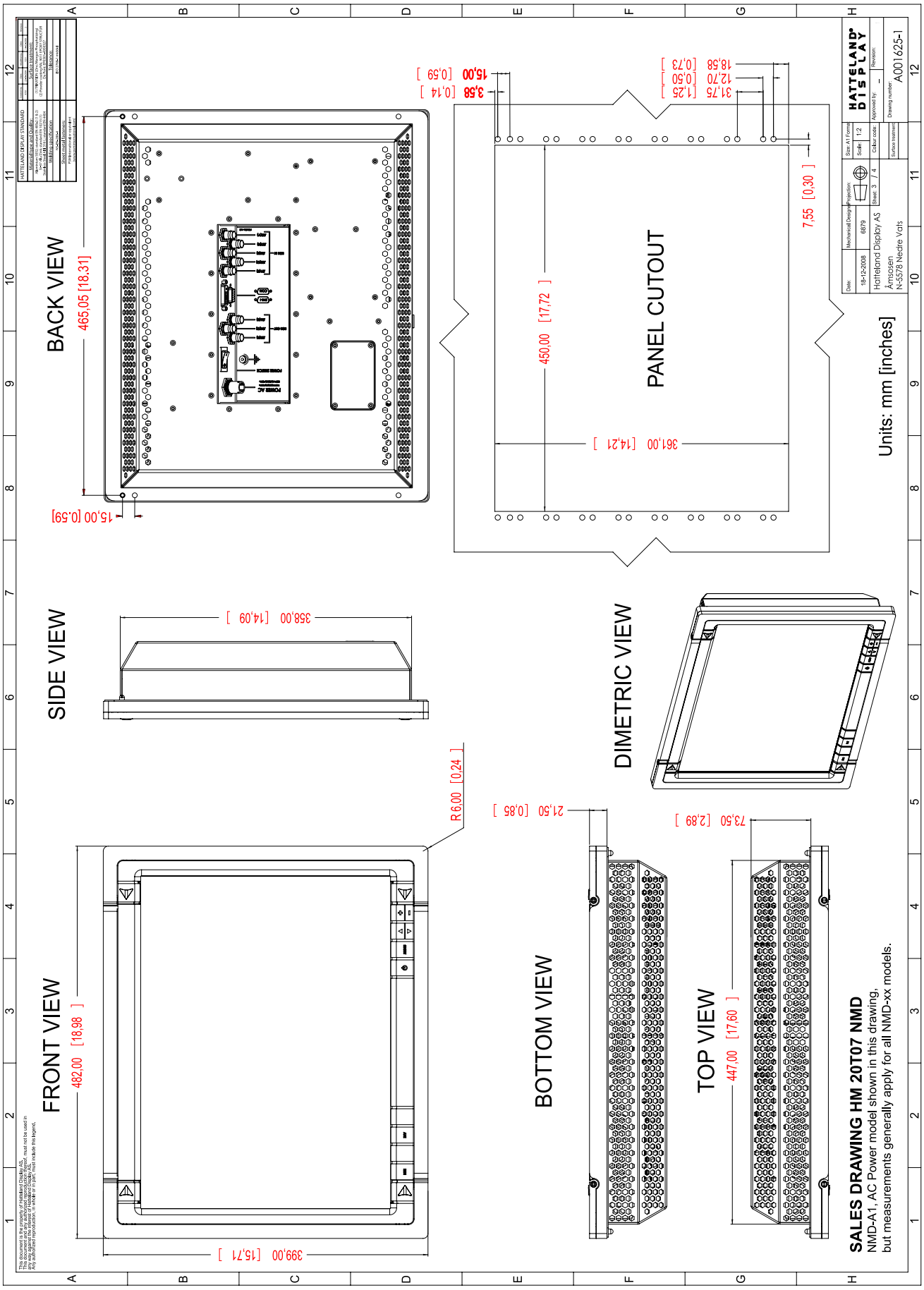
Technical Drawings



Dimensions might be shown with or without decimals and indicated as mm [inches]. Tolerance on drawings is +/- 1mm. For accurate measurements, check relevant DWG file.

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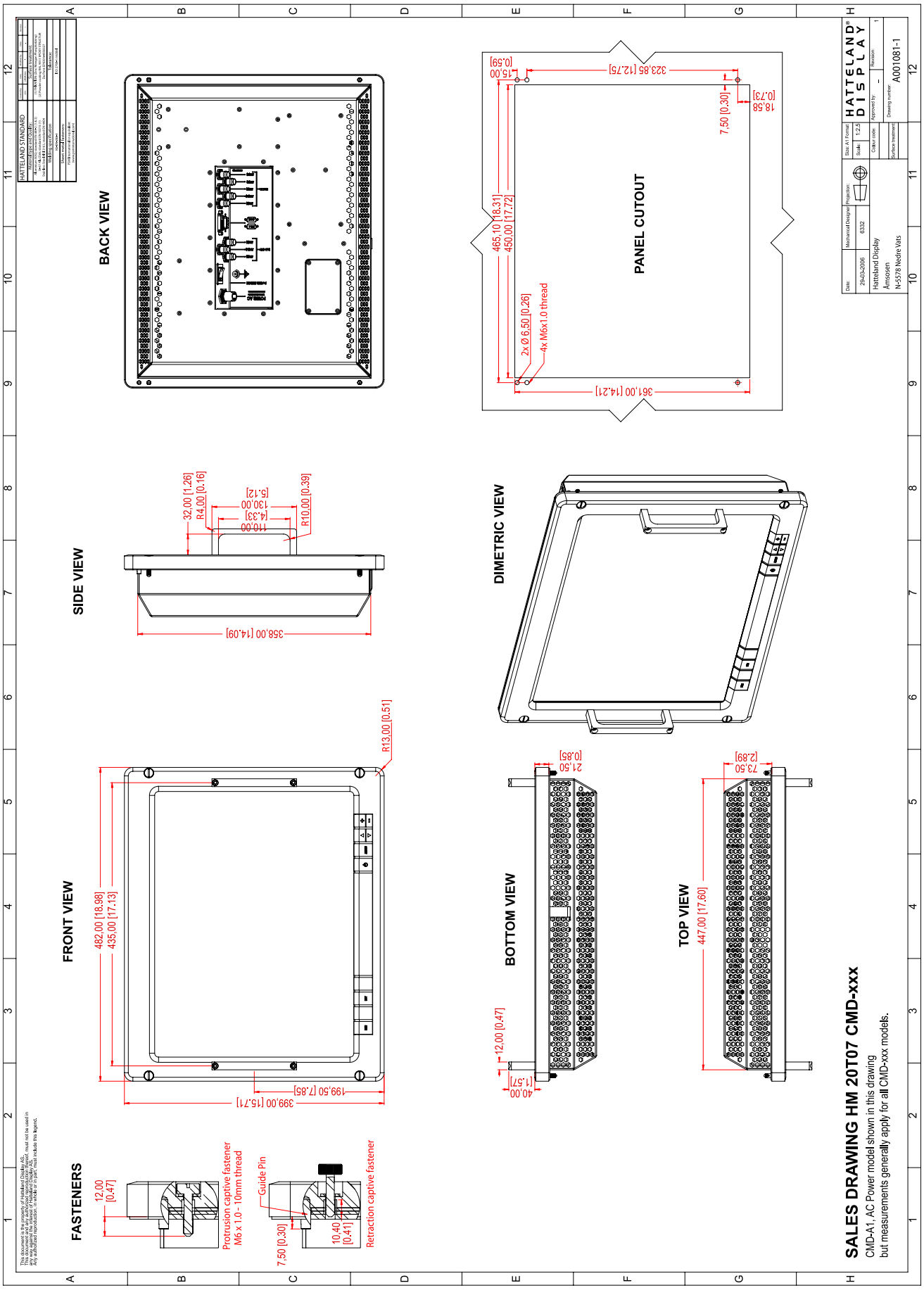

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Technical Drawings - Accessories

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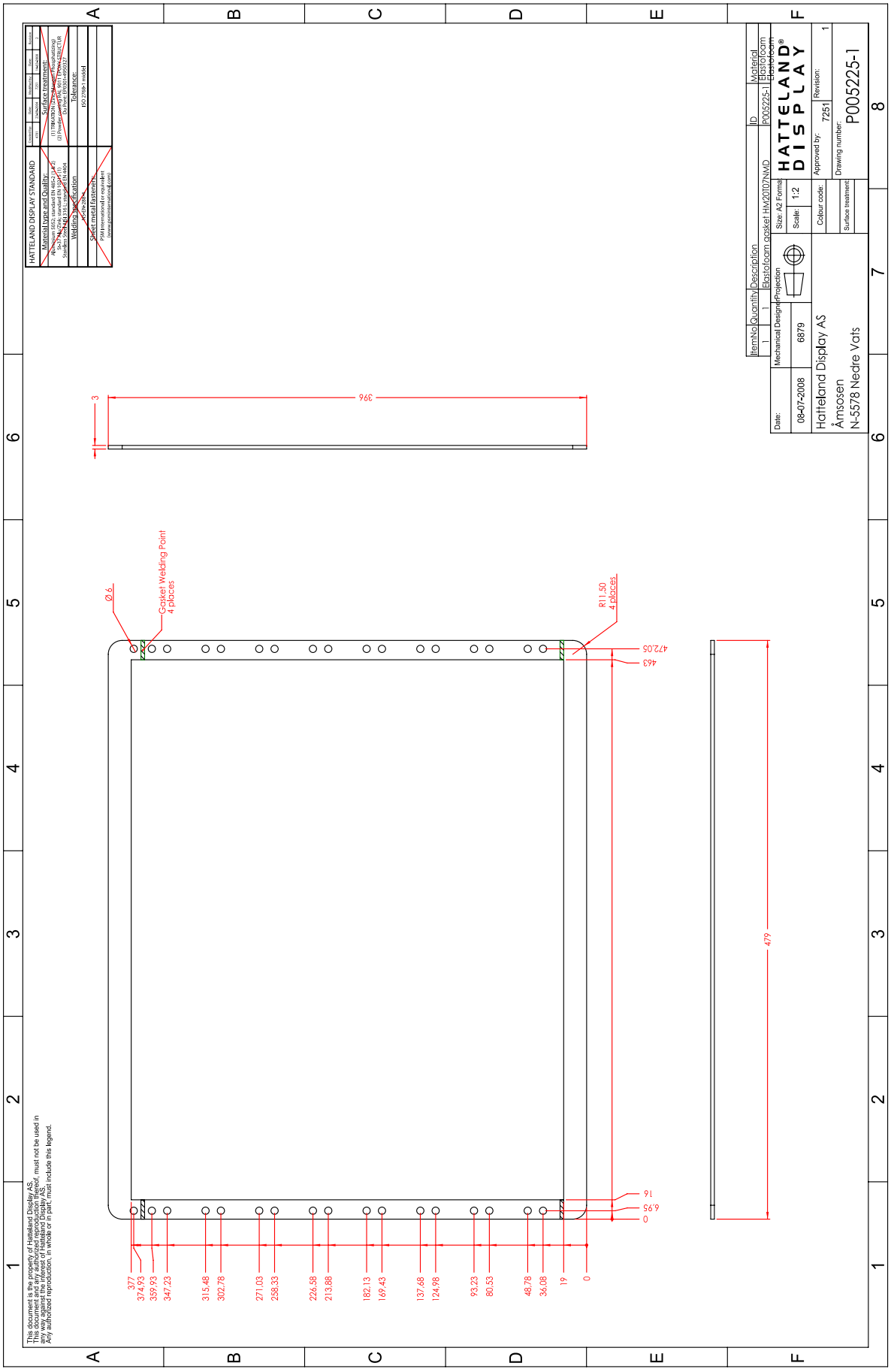

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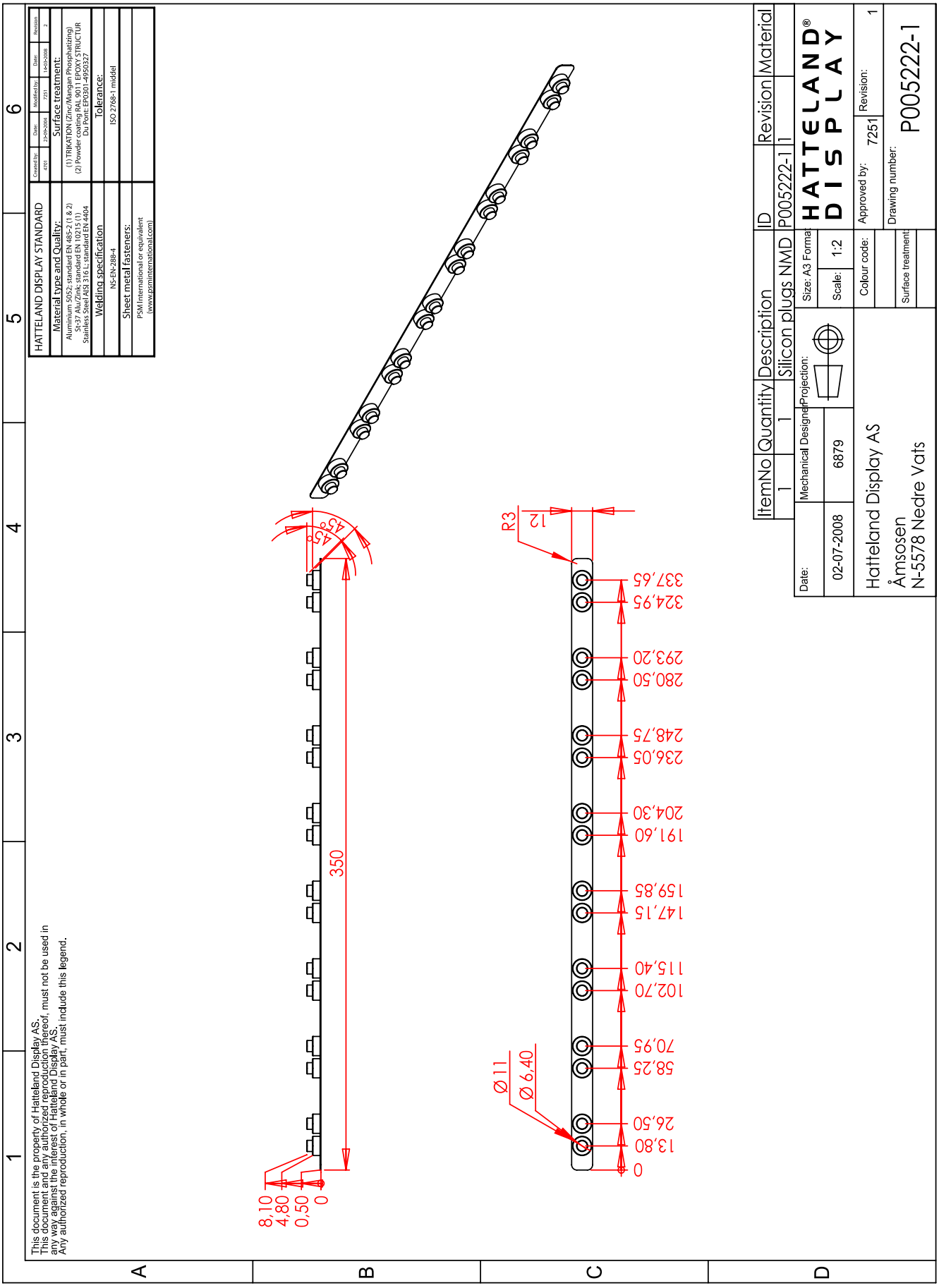

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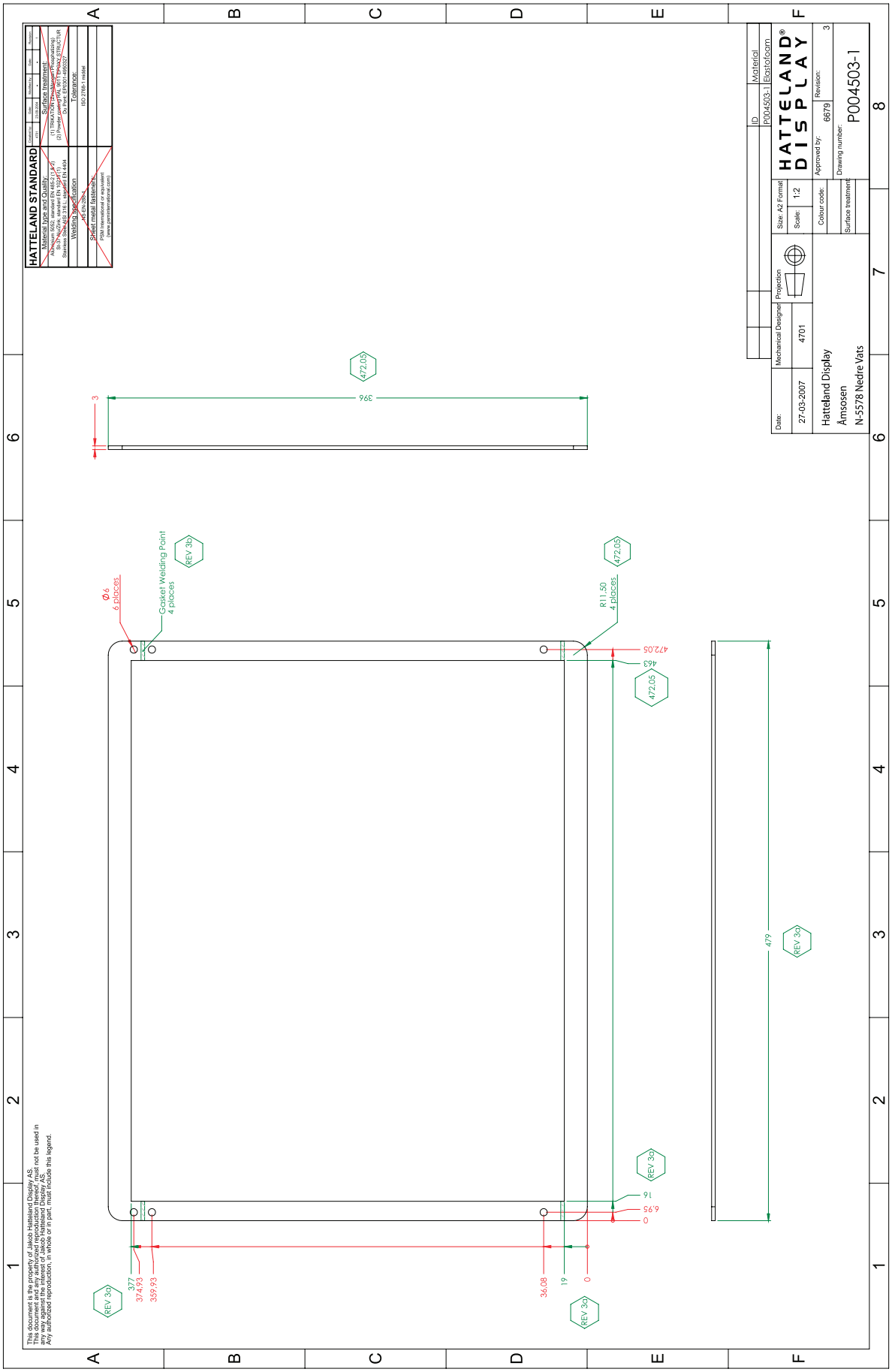

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Appendixes

HATTELAND® SCOM Control Interface

This document defines the electrical signals, connectorization, serial data format, and communication protocol of the Serial Communication Control Interface. The purpose of this interface is to provide means for a computer application to mainly remote control the LCD backlight.

Interface configuration

The serial interface can have different configurations, selected by several switches as shown in the illustration on the next page.

Brightness Control Operation

The backlight brightness at the unit can be controlled in two modes. A serial interface is used to command the level of backlight brightness and to select mode.

1) Using the local manual brightness control, an operator is only able to adjust brightness to levels lower than the set maximum, including dimming the backlight to extinction.

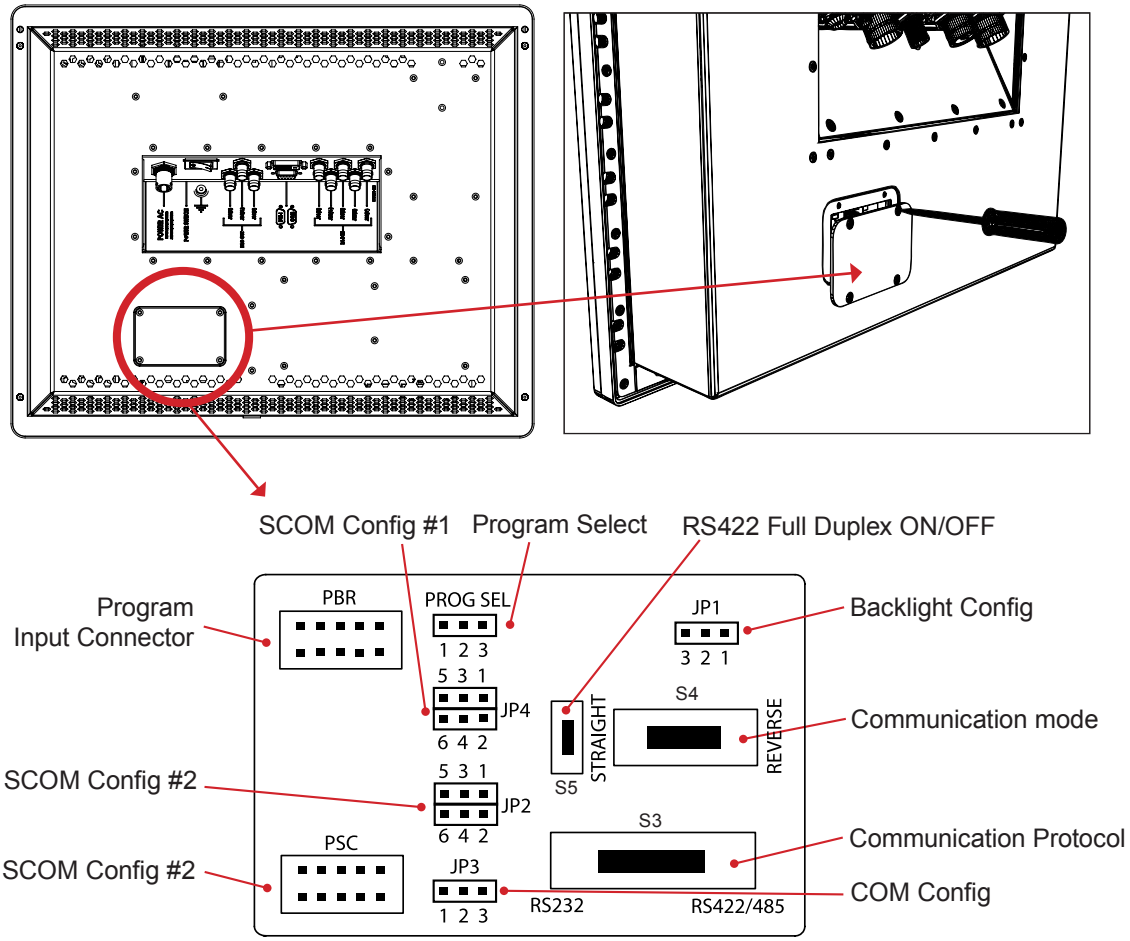
2) Brightness is independent of local manual brightness control, set by remote control only.

Electrical Interface

Electrical signals shall conform to RS-232. Only Receive Data, Transmit Data, and Signal Ground are used. Hardware handshake is only supported by loopback handshake for RS-232.

Comm settings

The communication options are set by dip switches and jumpers, placed at the backside of the unit. These switches/ jumpers are protected behind a hatch mounted with four screws. Unscrew those, and remove the hatch. The communication settings and its switches are illustrated below.



Reference	Part number	Description	Type	Additional information
JP1	1-2 MENU BRT CONTROL 2-3 ALWAYS ON	MENU LED Brightness and ON/OFF Control	Jumper	Removal of this jumper will deactivate key backlight. INV LED and Power LED will still be active though.
JP2	1-3 SCOM-A1	SCOM-A1 BEEPER- TO CHGND	Jumper	
JP2	2-4 SCOM-A1	SCOM-A1 COM1-9 VIA 100R TO CHGND	Jumper	
JP3	OPEN COM1-1=NC OPEN COM3-11=NC	COM1-1 and COM3-11 pin select	Jumper	COM2-1 = 5V (ALWAYS)
JP4	1-3 SCOM-A1	SCOM-A1 = COM1/2-4 OPEN OR VIA 100R TO CHGND	Jumper	
JP4	2-4 SCOM-A1	SCOM-A1 = COM1/2-6 OPEN OR VIA 100R TO CHGND	Jumper	
S3	COM1/2 RS-232	RS-232 supported ONLY	Switch	RS-232 SUPPORT ONLY!
S4	STRAIGHT TX/RX	COM1/2 Straight or Crossed(Switched) TX/RX select	Switch	
S5	RS422 FULL DUPLEX	COM1/2 FULL(RS422) or HALF(RS485) operation	Switch	NOT SUPPORTED!
PROG_SEL	PROGRAM U5	Program Select for programming U5 via PBR header	Jumper	
PROG_SEL	PROGRAM U12	Program Select for programming U12 via PBR header	Jumper	

Factory Default Settings

The factory defaults are based on the configuration when ordered. To configure the unit back to its factory defaults, please contact your provider.

Data Rate
The unit is configured to transmit and receive data at 9600 bits/second.

Data Format
Data shall be transmitted with no parity, 8 data bits, one start bit, and one stop bit.

Message Format
The basic message format shall be as follows:

Byte #	0	1	2,3,4	5	6	7, etc	7+LEN
	ATTN	ADDR	CMD	LEN	IHCHK	DATA	IDCHK

The minimum message size is 7 bytes. The maximum message size is 82 bytes, consistent with 61162-1.

Attention (ATTN)
This byte is used to identify a start of message. It can be one of 3 values:

ATTN	Description	
0x07	Command	(ASCII BELL)
0x06	Acknowledge	(ASCII ACK)
0x15	Negative Acknowledge	(ASCII NAK)

A device shall send a command using the 0x07 Attention Code. The unit will respond to the command with either an ACK if the command completed successfully, or a NAK if the command failed.

Address (ADDR)
This byte is used to specify a particular unit to receive a Command and to identify the unit responding (ACK or NAK) to a Command. All units will support the broadcast address. The unit will meet all functional requirements without individual unit addressing.

The Address field shall have the following values:

ADDR	Description
0xFF	Broadcast - Addressed to all units
0x00 to 0x0F	Address of a specific unit (max of 16 units)

Command (CMD)
The command shall be one of the following values:

CMD 0	CMD 1	CMD 2	ASCII	Description
0x42	0x52	0x54	“BRT”	Brightness Command
0x4D	0x41	0x4E	“MAN”	Manufacturer ID Code
0x56	0x45	0x52	“VER”	Unit ID Version Number
0x50	0x4F	0x54	“POT”	Potentiometer control
0x4D	0x43	0x43	“MCC”	Unit Control Command*
0x54	0x59	0x50	“TYP”	Type/Model Number Command
0x45	0x45	0x43	“ETC”	Elapsed TIme Counter**

*Note: This command is not available for Maritime Multi Computer (MMC) units.
**Note: This command is not available for pre Feb 2005 units

Data Length (LEN)
This byte defines the length of DATA in the message in bytes. The maximum value for this field shall be 74 bytes. The minimum value is 0 bytes.

Inverse Header Checksum (IHCHK)
This is a simple 8-bit checksum of the header data, message bytes 0 to 5 on which a bit-wise inversion has been performed. The checksum shall be initialised to 0. The 8-bit sum (without carry) of bytes 0, 1, 2, 3, 4, 5 and 6 shall be 0xFF.

To any message that fails the checksum, the receiver shall reply with the attention code set to NAK and no data field. This requirement does not apply to Broadcast messages in RS-485 (for units that support it) mode, in which case there will be no reply.

Data Field (DATA)
The DATA field shall only be transmitted if LEN is greater than 0. This field is dependent upon the CMD transmitted.

Inverse Data Checksum (IDCHK)
These bytes shall only be transmitted if LEN is greater than 0. This is a simple 8-bit checksum of the data field, message bytes 7 to 7+(LEN-1) on which a bit-wise inversion has been performed. The checksum shall be initialized to 0. The 8-bit sum (without carry) of bytes 7 through 7+LEN inclusive shall be 0xFF. The receiver will reply to any message that the checksum has failed with the attention code set to NAK. This requirement does not reply to broadcast messages in RS-485 (for units that support it) mode, in which case there will be no reply.

Message Commands
The following sections define the message formats for each of the specific commands.

Brightness Command "BRT"
This command shall be sent to the unit to command the backlight brightness control setting.The brightness value shall be sent as 1 byte in the DATA field. A setting of 0x00 will indicate off. A setting of 0xFF will indicate maximum brightness. Intermediate values will control brightness over the range from minimum to maximum luminance.

If the data checksum is valid and the brightness was set, the unit will reply to this command with an ACK attention code. The DATA field in the reply shall indicate the resulting brightness control setting. If an invalid checksum was received and the message was not Broadcast and RS-485 (for units that support it), the unit will reply with an NAK attention code. The DATA field in the reply will indicate the current brightness control setting.

Examples:
Command 60% Brightness:

0x07	0xFF	0x42	0x52	0x54	0x01	0x10	0x99	0x66

Acknowledge 60% Brightness:

0x06	0xFF	0x42	0x52	0x54	0x01	0x11	0x99	0x66

Negative Acknowledge 40% Brightness:

0x15	0xFF	0x42	0x52	0x54	0x01	0x02	0x66	0x99

Manufacturer ID "MAN"

This command shall be sent to the unit to request Manufacturer ID Code. No data shall be sent with this command. The unit will reply to this command with an ACK attention code. The DATA field will be set to an ASCII string value that is unique for each manufacturer.

Examples:
Command Manufacturer ID Code:

0x07	0xFF	0x4D	0x41	0x4E	0x00	0x1D

Acknowledge Manufacturer ID Code "JHD":

0x06	0xFF	0x4D	0x41	0x4E	0x03	0x1B	0x4A	0x48	0x44	0x29

Unit ID Model/Version Number "VER"

This command shall be sent to the unit in order to identify unit type by preassigned code and, establish the version of the serial communications interface software. No data shall be sent with this command.

Any future revisions, such as additions or changes to the commands or data fields shall be coordinated with a difference in the unit Version Number. The unit will reply to this command with an ACK attention code. The DATA field has a unique 1-byte unit model code. The next 2 bytes shall contain major and minor version of the serial communication protocol in use. Currently the unit model field is set to 0x01. The Version Number field for version 1 is set to 0x01 0x00.

Examples:
Command Unit Model/Version Number:

0x07	0xFF	0x56	0x45	0x52	0x00	0x0C

Unit Version 1.0:

0x06	0x05	0x56	0x45	0x52	0x03	0x04	0x01	0x01	0x00	0xFD

Potentiometer control "POT"

The unit may allow the backlight to be controlled by the local control (potentiometer) mounted on the front of the unit by the remote control, or by the combination of the two. This command provides means to enable/disable the potentiometer. LEN = one data byte.

0x00	Disables the potentiometer. Backlight controlled only by the remote control.
0xFF	Enables the potentiometer. Backlight is controlled by both the remote serial interface and the potentiometer. (Default) Note: In this setting, with the BRT command at 100%, the front potentiometer has full control of the backlight. This is the initial setting when a unit is powered on.

If the data checksum is valid, the unit will reply to this command with an ACK attention code. The DATA field will indicate the resulting control setting. If an invalid data checksum was received and the message was not broadcast and RS485 (for units that support it), the unit will reply with a NAK attention code and the current control setting.

Unit control command "MCC"

This command is used for communication with the video interface controller of the unit to allow remote command of the unit's setup parameters. The video controller commands are transmitted in the data field. See appendix for complete list of controller commands. Please note that this feature is not supported by all video controllers / units.

For future products, it can not be guaranteed that all commands will still be available.
Note: Maritime Multi Computer (MMC) units do not have a video interface controller internally and the MCC command is therefore not supported.

If the checksum is valid, the unit will reply to this command with an ACK attention code, where the data field contains the original command followed by acknowledge from the controller, as described in the appendix. If the checksum is invalid and the message was not broadcast and RS-485 (for units that support it), the unit will reply to this command with a NAK attention code, where the data field contains the original command.

Examples:
Command 50% contrast 0x82 0x41 0x38 0x30:
(50% of 0xFF=0x80. In ASCII 80 will be: 0x38 0x30)

0x07	0xFF	0x4D	0x43	0x43	0x04	0x22

0x82	0x41	0x38	0x30	0xD4

Acknowledge 50% Contrast:

0x06	0x03	0x4D	0x43	0x43	0x06	0x1D

0x82	0x41	0x38	0x30	0x38	0x30	0x6C

Unit Type/Model Number "TYP"

This command shall be sent to the unit in order to identify the unit type by its model number / part number. No data shall be sent with this command.

The unit will reply to this command with an ACK attention code. The DATA field will be set to an ASCII string to indicate the specified Type/Model Number, e.g: "JH23T01MMD-A1"

Examples:
Command Type/Model Number

0x07	0xFF	0x54	0x59	0x50	0x00	0xFC

Acknowledge Type/Model Number "JH20T03":

0x06	0xFF	0x54	0x59	0x50	0x07	0x1A

0x4A	0x48	0x32	0x30	0x54	0x30	0x33	0x54

Operational Requirements

The following sections define the operational requirements.

Initial and Default Unit Conditions

After any power cycle, the unit will start-up with the maximum brightness control range available at the local control and with combined control of the backlight enabled from both the local control (potentiometer) and the remote BRT command. If no serial messages are received, the unit will stay in this configuration.

Serial Message Failure
If serial messages stop being transmitted or are corrupt, the unit will remain at the last commanded brightness.

Periodic Messages
The Brightness Command shall be transmitted to the unit at a repetition no faster than 4 Hz.

Fault Detection and Power Interruption Recovery
To support implementation of keep-alive alarm logic in application software on the computer, the Brightness Command message output from the computer to the unit can be repeated once per second, driven by receiving valid acknowledge messages from the unit. The keep-alive logic should tolerate intermittent loss of valid acknowledge messages without activating an alarm.

Response Time

Individually Addressed Command Response
The unit will output the required response within Tr = 2.5 character periods after the last byte of a command message is received (2.6mS at 9600 bit/sec), except as specified herein.

Elapsed Time Counter "ETC"
Note: This command is not available on pre Feb 2005 units.
The unit features an elapsed time counter which counts the total number of hours that the unit has been switched on. The ETC command can be sent to the unit to acquire the elapsed time in hours. No data shall be sent with this command. The unit will reply to this command with an ACK attention code. The DATA field will be set to a three byte string, where the most significant byte is transmitted first.

The ETC has a limit on maximum 298.261 hours, equivalent to 34 years. When this number is reached, the ETC will stop counting, and the ETC command will always reply with maximum number of hours.

Examples:
ETC Command:

0x07	0xFF	0x45	0x54	0x43	0x00	0x1D

Answer, two hours elapsed time:

0x06	0xFF	0x45	0x54	0x43	0x03	0x1B	0x00	0x00	0x02	0xFD

Broadcast Command Response

In response to RS-485 (for units that support it) broadcast command messages, after the last byte of the command message is received, all units will reply within the time period defined for Te, below. Further more, any gap between these individual responses will be less than the Intermessage Gap, defined below.

Te = (Tr + Lr) * N, where
Lr = length of the ACK/NAK message response
Tr = response time
N = the total number of units. *

*) As the units reply in order to their address, the units must be given subsequent addresses, starting at zero, for N to equal the total number of units. If not, N = the highest unit address + 1.

The maximum Lr for each command are shown in the table below:

Command	BRT	MAN	VER	TYP	POT	MCC
Lr	9	13	11	28	9	17

Example: For the BRT command, and 8 units, this corresponds to
Te = (2.5 * 10 + 9 * 10) * 8 / 9600 = 95.8 ms

MCC Response

For broadcast messages in RS485 (for units that support it) mode, the data field of an ACK is limited to 9 bytes, and LEN of command + LEN of ACK is limited to 14. This leads to the response time: 102ms + N * 21ms.

Inter-message Gap

Following an individually addressed command, the next command shall not be issued until at least Tg = 5 character periods after the ACK or NAK message received. At 9600, that is 5 * 10 / 9600 = 5.2ms.

Following the issue of a broadcast command message, the next command shall not be issued until at least Tc = Te + Tg, where Te is as defined for Broadcast Command response and Tg is defined above.

Unit Response and Addresses

When individual unit addressing is supported by an installed configuration of units in a RS-485 (for units that support it) system, a separate ACK or NAK message for each unit will be transmitted providing each unit's individual address in response to any broadcast-addressed Command.

NAK messages will not be generated when an error in a Broadcast message is detected. When individual unit addressing is not supported, the unit will only respond to the broadcast address and will include the broadcast address in the ACK and NAK messages. NAK messages will not be generated when an error in a Broadcast message is detected.

When a unit receives an incomplete message and the next byte is not received until after a time equal to the Intermessage Gap, the next bytes received shall be processed to check for the start of a new command (0x07, ASCII Bell).

If the header checksum is valid, but the first byte of the command message is not 0x07, as specified, the unit may wait until after the next inter-message gap to resume checking. A NAK message shall not be generated.

If the header checksum is valid, but the value of the CMD field does not equal one of the defined commands, the unit shall reply by generating a NAK message as though a VER command had been received.

If the header checksum is valid, but the value of the LEN field is greater than the maximum allowed, the unit shall ignore the message. A NAK message shall not be generated.

If the data checksum is valid, but the value in the DATA field associated with a command is invalid (out of range, undefined, etc.), the unit shall generate a NAK message indicating the current data value in the DATA field.

Additional Commands

In time, additional commands and corresponding data fields may be defined. These additions will not conflict with the operation of the interface as defined herein.

(Note: Some commands may not be available on older models).

Revision 0.09.00

COMMAND TABLE

Commands to implement switch mount control buttons

Function	Command	Description	Acknowledge (if enabled)
Brightness control	0x81, nn | "+" | "-" | "r" | "R" | "?"	Set brightness = value/increment/decrement Reset Query	Brightness.
Contrast control - all channels	0x82, "a" | "A", nn | "+" | "-" | "r" | "R" | "?"	Set all contrast = value/increment/decrement Reset Query	Contrast.
Colour temperature select	0xb3, n | "r" | "R" | "?"	Select colour temperature = value Reset Query	Main selected. "0" – 9500K. "1" – 8000K. "2" – 6500K. "3" – 5000K.
Red level for selected colour temperature	0xb4, nn | "+" | "-" | "r" | "R" | "?"	Set the level of the red channel for the selected colour temp. = value/increment/decrement Reset Query	Red level for selected colour temperature.
Green level for selected colour temperature	0xb5, nn | "+" | "-" | "r" | "R" | "?"	Set the level of the green channel for the selected colour temp. = value/increment/decrement Reset Query	Green level for selected colour temperature.
Blue level for selected colour temperature	0xb6, nn | "+" | "-" | "r" | "R" | "?"	Set the level of the blue channel for the selected colour temp. = value/increment/decrement Reset Query	Blue level for selected colour temperature.
Frequency (In PC mode only)	0x8b, nnnn | "+" | "-" | "?"	Set H active size = Value/increment/decrement Query	Graphic mode H active size (in pixels)
Phase (tuning) control (In PC mode only)	0x85, nn | "+" | "-" | "r" | "R" | "?"	Set dot clock phase = value/increment/decrement Reset Query	Dot clock phase. (In PC mode only)
Picture Type (Video de-interlace method)	0xca, "0" | "1" "r" | "R" "?"	 De-interlace mode Reset Query	"0" – motion video. "1" – static picture. "2" – normal (non-flicker video mode)
OSD status enquiry	0xbb	Status of OSD	"0" – OSD turned off "1" – OSD turned on
Image H position	0x86, nnnn | "+" | "-" | "r" | "R" | "?"	Set img_hpos = value/increment/decrement Reset Query	Image horizontal position.
Image V position	0x87, nnnn | "+" | "-" | "r" | "R" | "?"	Set img_vpos = value/increment/decrement Reset Query	Image vertical position.

Video Controller Interface Commands

Function	Command	Description	Acknowledge (if enabled)
PIP window size select	0xa6, nn | “r” | “R” | “?”	Select PIP window size = PIP window size value Reset Query	Main selected. PIP off if “nn” = “00”.
PIP source select	0xa7, n | “r” | “R” | “?”	Select input main = Video source value Reset Query	Main selected. “0” – auto. “1” – Composite video. “2” – S-video. “3” – Component video.
PIP H position	0xa4, nnn | “+” | “-” | “r” | “R” | “?”	Set PIP_hpos = value/increment/decrement Reset Query	PIP window horizontal position.
PIP V position	0xa5, nnn | “+” | “-” | “r” | “R” | “?”	Set PIP_vpos = value/increment/decrement Reset Query	PIP window vertical position.
PIP brightness control	0xa2, nn | “+” | “-” | “r” | “R” | “?”	Set PIP window brightness = value/increment/decrement Reset Query	PIP window brightness.
PIP contrast control	0xa3, nn | “+” | “-” | “r” | “R” | “?”	Set PIP window contrast = value/increment/decrement Reset Query	PIP window contrast.
Tint control (for NTSC video mode only)	0x84, nn | “+” | “-” | “r” | “R” | “?”	Set tint = value/increment/decrement Reset Query	NTSC tint
Color control (for video mode only)	0x83, nn | “+” | “-” | “r” | “R” | “?”	Set color = value/increment/decrement Reset Query	PAL/NTSC color
Graphic Mode Sharpness (In RGB mode only)	0x89, n | “+” | “-” | “r” | “R” | “?”	Set graphic mode sharpness = Value/increment/decrement Reset Query	Graphic mode sharpness.
Video Sharpness (In video mode only)	0x8a, n | “+” | “-” | “r” | “R” | “?”	Set sharpness = value/increment/decrement Reset Query	Video Sharpness.
Video source type select (In video mode only)	0x9c, n | “r” | “R” “?”	Select video source type = Value Reset Query	Video source type: “0” – DVD “1” - VCR

Function	Command	Description	Acknowledge (if enabled)
Video System (In video mode only)	0x9b, “0” | “1” | “2” | “3” | “r” | “R” | “?”	Set video system = Auto/NTSC/PAL/SECAM Reset Query	“0” – Auto. “1” – NTSC_M_358 “2” – PAL_N_443 “3” – SECAM “4” – NTSC_M_443 “5” - PAL_M_358 “6” – NTSC_N_358 “7” – PAL_M_443 “8” – NTSC_N_443 “9” – PAL_N_358 (In video mode only)
Rotate video image	0xc7, “0” | “1”	Disable/enable video rotate	“0” – normal video image. “1” – rotated video image.
Scaling Mode	0x8c, “0” | “1” | “2” | “3” “r” | “R” | “?”	Set graphic image scaling mode = value Reset Query	Image expansion on/off. “0” – 1:1. “1” – fill screen. “2” – fill to aspect ratio “3” – non-linear scaling “4” – expand letterbox video to fill screen “5” – expand letterbox video (with subtitles) to fill screen “6” – keep aspect ratio of 4:3 video on 16:9 screen “7” – expand 4:3 letterbox video to aspect ratio (on 16:9 screen) “8” – expand 4:3 letterbox video (with subtitles) to aspect ratio (on 16:9 screen)
Scalar H pan position	0xb1, nnn | “+” | “-” | “r” | “R” | “?”	Set horizontal pan position for 1:1 scale mode = value/increment/decrement Reset Query	Scalar horizontal pan position.
Scalar V pan position	0xb2, nnn | “+” | “-” | “r” | “R” | “?”	Set vertical pan position for 1:1 scale mode = value/increment/decrement Reset Query	Scalar vertical pan position.
Scalar H Clipping	0xab, nnn | “+” | “-” | “r” | “R” | “?”	Set the horizontal clipping size for non-linear scale mode = value/increment/decrement Reset Query	Scalar horizontal clipping
Scalar H Offset	0xac, nnn | “+” | “-” | “r” | “R” | “?”	Set the horizontal offset of the display window for non-linear scale mode = value/increment/decrement Reset Query	Scalar horizontal offset.
Scalar H stretch	0xad, nnn | “+” | “-” | “r” | “R” | “?”	Set horizontal stretch factor for non-linear scale mode = value/increment/decrement Reset Query	Scalar horizontal stretch.

Video Controller Interface Commands

Function	Command	Description	Acknowledge (if enabled)
Scalar V Clipping	0xae, nnn | “+” | “-” | “r” | “R” | “?”	Set the vertical clipping size for non-linear scale mode = value/increment/decrement Reset Query	Scalar vertical clipping
Scalar V Offset	0xaf, nnn | “+” | “-” | “r” | “R” | “?”	Set the vertical offset of the display window for non-linear scale mode = value/increment/decrement Reset Query	Scalar vertical offset.
Scalar V stretch	0xb0, nnn | “+” | “-” | “r” | “R” | “?”	Set vertical stretch factor for non-linear scale mode = value/increment/decrement Reset Query	Scalar vertical stretch.
Select OSD language	0x95, n | “r” | “R” | “?”	Select language = English, Danish, Chinese Reset Query	“0” – English. “7” – Danish “8” – Chinese
Input main select	0x98, n | “+” | “-” | “r” | “R” | “?”	Select input main = PC or VIDEO or next available Reset Query	Main selected. “0” – PC. “1” – Composite video. “2” – S-video. “3” – Component video. “4” - DVI
Select menu timeout	0x93, nn | “+” | “-” | “r” | “R” | “?”	Select menu timeout = value/increment/decrement Reset Query	OSD menu timeout value. “00” – Continuous. value – Round up to nearest available step. if value > max available step, set it to the max available step.
DPMS Option	0x9f, “0” | “1” | “r” | “R” | “?”	Set power down option = On/Off Reset Query	“0” – Off. “1” – On.
Display Video Source Select	0xbc, “?” | “0” | “1”	 Query Name of video source not displayed. After switching to a new video source, the name of the video source is displayed for 5 seconds.	“0” – disabled. “1” – enabled.
Auto source select	0x99, “0” | “1” | “r” | “R” | “?”	Set exclusive or priority = Exclusive/Proirity Reset Query	“0” – Exclusive. “1” – Priority. “2” – Priority during power up.
GAMMA value select	0x9d, n | “r” | “R” “?”	Select GAMMA value = Value Reset Query	GAMMA value: “0” – 1.0, “1” – 1.6 “2” – 2.2, “3” – User Defined

Video Controller Interface Commands

Function	Command	Description	Acknowledge (if enabled)
Video Port Select	0xbe, ”0”, ”?” 0xbe “0” , “R” | “r” 0xbe, ”0”, n 0xbe, “1”, “?” 0xbe, “1”, “R” | “r” 0xbe, “1”, n 0xbe, “2”, “?” 0xbe, “2”, “R” | “r” 0xbe, “2”, n	Query Composite Video Port No. Set Composite Video Port No. = “0” Set Composite Video Port Number Query Svideo Port Number Set Svideo Port Number = “0” Set Svideo Port Number Query Component Video Port No. Set Component Vid. Port No. = “0” Set Component Video Port Number	“0n” – Port number
OSD H position	0x90, nnn | “+” | “-” | “r” | “R” | “?”	Set osd_hpos = value/increment/decrement Reset Query	OSD horizontal position.
OSD V position	0x91, nnn | “+” | “-” | “r” | “R” | “?”	Set osd_vpos = value/increment/decrement Reset Query	OSD vertical position.
OSD Transparency	0x92, n | “+” | “-” | “r” | “R” | “?”	Set OSD transparency = value/increment/decrement Reset Query	OSD tranparency.
Rotate OSD	0x8f, “0” | “1” | “?”	Disable/enable OSD rotate Query	“0” – normal OSD. “1” – rotated OSD.
Freeze frame	0xc6, “0” | “1”	Unfreeze / freeze frame	“0” – unfreeze. “1” – freeze.
Zoom level	0xa8, nn | “+” | “-” | “r” | “R” | “?”	Set Zoom level = value/increment/decrement Reset Query	Zoom level.
Zoom H position	0xa9, nnn | “+” | “-” | “r” | “R” | “?”	Set Zoom_hpos = value/increment/decrement Reset Query	Zoom window horizontal position.
Zoom V position	0xaa, nnn | “+” | “-” | “r” | “R” | “?”	Set Zoom_vpos = value/increment/decrement Reset Query	Zoom window vertical position.
Direct Access (Hotkeys)	0xa0, “1”, n | “r” | “R” | “?”	Set Hotkey 1= Value Reset Query	“0” – audio mute. “1” – volume. “2” – brightness. “3” – contrast. “4” – color. “5” – input source. “6” – video input. “7” – zoom “8” – freeze “9” – PIP “A” – Test Pattern “B” – No function

Video Controller Interface Commands

Function	Command	Description	Acknowledge (if enabled)
Direct Access (Hotkeys)	0xa0, "2", n | "r" | "R" | "?"	Set Hotkey 2 = value Reset Query	"0" – audio mute. "1" – volume. "2" – brightness. "3" – contrast. "4" – color. "5" – input source. "6" – video input. "7" – zoom "8" – freeze "9" – PIP "A" – Test Pattern "B" – No function
Set display orientation	0x8e, n | "r" | "R" | "?"	Set display orientation = value/increment/decrement Reset Query	"0" – normal. "1" – vertical inverse. "2" – horizontal inverse. "3" – inverted.
Auto-calibration	0xc5	Start auto-calibration of gain of the RGB amplifier.	"0" – fail. "1" – successful.
Set gamma data for user defined gamma curve	0xbf, mm, c, "?" 0xbf, "R" | "r" 0xbf, mm, c, nn	Query gamma data for color c index mm (c = 0 for color Red, c=1 for color Green, c=2 for color Blue) Set user gamma curve to linear Set gamma data for color c index mm. (If c= 3, then gamma data for red, green & blue will be set at the same time.)	"nn" = gamma data "1" "nn" = gamma data
Soft Power On/Off	0xc8, "0" | "1" | "?"	Soft power off/on query	"0" – soft power off. "1" – soft power on.
Query video input status	0xc9	Query the status of the primary & pip status	"nn" = input status 2nd digit = primary status: "0" : invalid "1" : connected to valid RGB "2" : connected to valid composite "3" : connected to valid Svideo "4" : connected to valid YcbCr "5" : connected to valid DVI 1st digit = PIP input status: "0" : invalid "2" : connected to valid composite "3" : connected to valid Svideo "4" : connected to valid YcbCr
Query BIOS version	0xcb, "0"	Read BIOS version	"nnnn" = BIOS ver. "nn.nn"
Query PCBA number	0xcb, "1"	Read PCBA number	"nnnn" = PCBA number
Query average picture level	0xcc, "0" | "1" | "2"	Read APL for red channel Read APL for green channel Read APL for blue channel	"nn" = average picture level
Test Pattern	0xcd, "0" | "1"	Leave test pattern display mode Display test pattern screen	"0" = normal display "1" = displaying built in test pattern
Load the factory default (Reset parameter)	0xce	Reset all parameters to default value	"1" – successful.

Function	Command	Description	Acknowledge (if enabled)
Saving the user default	0xd7	Saving all parameters to user default value	“1” - successful.
Loading the user default	0xd8	Loading all parameters to user default value	“1” - successful.
Volume control - left+right channel	0x80, “a” | “A”, nn | “+” | “-” | “r” | “R” | “?”	Set audio (L+R) volume = value/increment/decrement Reset Query	volume control
Volume control - on/off (mute)	0x80, “m” | “M”, “0” | “1” | “r” | “R” | “?”	Disable audio output. Enable audio output. Reset Query	“0” - audio off (muted). “1” - audio on.

Other Control

Function	Command	Description	Acknowledge (if enabled)
Select video mode	0xc2, nn	Current vmode = nn.	Current video mode selected.
Auto-setup	0xc3	Start auto-setup of current vmode.	“0” – fail. “1” – successful.
Command availability	0xc4, nn	Check whether a command is available.	“0” – not available. “1” – available.
Graphic horizontal resolution enquiry	0xb7	Horizontal resolution (in pixels) in 3 digit hex number	“nnn” = horizontal resolution
Graphic vertical resolution enquiry	0xb8	Vertical resolution (in lines) in 3 digit hex number	“nnn” = vertical resolution
Graphic horizontal sync frequency	0xb9	Horizontal sync frequency (in units of 100Hz) in 3 digit hex number	“nnn” = horizontal frequency
Graphic vertical sync frequency	0xba	Vertical sync frequency (in units of Hz) in 3 digit hex number	“nnn” = vertical frequency
OSD turn off	0xbd	Turn off the OSD.	“0” – fail. “1” – successful.

n = 1-byte ascii-coded hex number, e.g., parameter value of 0x1 is represented by “1” (0x31).
nn = 2-byte ascii-coded hex number, e.g., parameter value of 0x1e is represented by “1”, “e” | “E” (0x31, x6e|0x4e).

Remarks:

1. Command 0xcd is only available for new units (05 May 2003 and after).
2. If the data sent to the controller is out of range, the controller will not set that value and there will be no acknowledgement.
3. If the command sent to the controller is not available for that controller, there will be no acknowledgement.
4. The controller will respond to RS-232 command when the controller is in standby, no video input or normal operating condition.
5. If the following parameters are changed through RS-232: Power Down Option, Exclusive/Priority, Input Source, Video Input, the controller should change state according to the latest setting immediately.

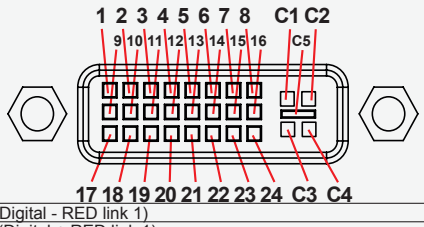
Revision History - HATTELAND® SCOM

Rev.	By	Date	Notes
1	LM	26 Nov 2001	Preliminary release.
1	LM	06 Mar 2002	1'st Release Remote control interface specification
2	LM	06 Mar 2002	Changed Pin description for Half duplex RS-485.
2	TK	17 Oct 2002	Renamed document description to Specification of Serial Communication Control Interface. Corrected Pin assignment of RS-232 (Tx and Rx).
3	LM	22 Oct 2002	Added new MCC commands. Added Block diagram. Added paragraph about setting desired communication mode.
4	LM	08 May 2003	Corrected example for MCC command (50% contrast).
5	SE	11 Aug 2003	Minor spell checking and text formatting.
6	SE	19 Feb 2004	Added note about physical placement of the DIP switches. (May vary from product to product)
7	SE	24 Jan 2005	Updated Video Interface Commands
8	SE	23 Feb 2005	Added a new command. ETC (Elapsed Time Counter)
9	SE BU	18 Sep 2007	Revised hatch placement illustration. Changed layout of manual to current company profile. Changed document book ID from IND100004-1 to INB100018-1 due to conflict with earlier documentation. Changed word "display" & "displays" to "unit" & "units", since also certain Maritime Multi Computers may also have the ability to be controlled by SCOM. References to "JH SCOM" was replaced by "HATTELAND® SCOM".
10	BU SE	12 Nov 2009	Revised logo and profile. Added typenumber range on front page. (page 1) Added note for MCC command (not available on Maritime Multi Computers range) (page 8,11) Renamed document filename from: "INB100018-1_Specification of Serial Communication Control Interface_Series1" to: "INB100018-1_Technical_Manual_Serial_Communication_Control_Interface(SCOM_A1C1)_Series1"

Pin Assignments

Note: Connectors are seen from users Point Of View (POV).

29P DVI-D & DVI-I - Female

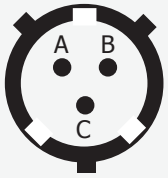


Pin 01	T.M.D.S. Data2 - (Digital - RED link 1)
Pin 02	T.M.D.S. Data2 + (Digital + RED link 1)
Pin 03	T.M.D.S. Data2/4 Shield
Pin 04	T.M.D.S. Data4 - (Digital - GREEN link 2)
Pin 05	T.M.D.S. Data4 + (Digital + GREEN link 2)
Pin 06	DDC Clock
Pin 07	DDC Data
Pin 08	Analog Vertical Sync (DVI-I only)
Pin 09	T.M.D.S. Data1 - (Digital - GREEN link 1)
Pin 10	T.M.D.S. Data1 + (Digital + GREEN link 1)
Pin 11	T.M.D.S. Data1/3 Shield
Pin 12	T.M.D.S. Data3 - (Digital - BLUE link 2)
Pin 13	T.M.D.S. Data3 + (Digital + BLUE link 2)
Pin 14	+5V Power (for standby mode)
Pin 15	Ground (for +5V and analog sync)
Pin 16	Hot Plug Detect
Pin 17	T.M.D.S. Data0 - (Digital - BLUE link 1) and digital sync.
Pin 18	T.M.D.S. Data0 + (Digital + BLUE link 1) and digital sync.
Pin 19	T.M.D.S. Data0/5 Shield
Pin 20	T.M.D.S. Data5 - (Digital - RED link 2)
Pin 21	T.M.D.S. Data5 + (Digital - RED link 2)
Pin 22	T.M.D.S. Clock Shield
Pin 23	T.M.D.S. Clock + (Digital clock + (Links 1 and 2)
Pin 24	T.M.D.S. Clock - (Digital clock - (Links 1 and 2)
Pin C1	Analog RED
Pin C2	Analog GREEN
Pin C3	Analog BLUE
Pin C4	Analog Horizontal Sync.
Pin C5	Analog Ground (return for RGB signals)

DDC = Display Data Channel /// T.M.D.S = Transition Minimized Differential Signal /// PIN C1,C2,C3,C4 = Only present on DVI-I connectors.
NOTE: Connector shows a DUAL LINK design, but some units may not support it. Only products with 1920x1200 or more in resolution require / support DUAL LINK.

3P CIRCULAR AC POWER

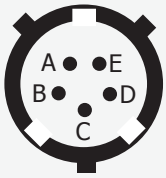
AMP MS27468T9F98P



Pin A	Neutral
Pin B	Hot
Pin C	Ground

5P CIRCULAR DC POWER

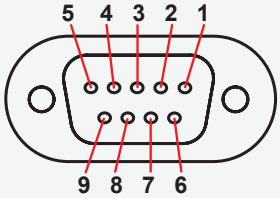
AMP MS27468T15F5P



Pin A	+ 28VDC
Pin B	+ 28VDC
Pin C	Ground
Pin D	- 28VDC
Pin E	- 28VDC

9P D-SUB COM - Female

For combined touch and SCOM / BIT Interface



Pin 01	Not Connected
Pin 02	RXD - Receive Data for Touch
Pin 03	TXD - Transmit Data for Touch
Pin 04	Not Connected
Pin 05	Ground
Pin 06	RXD - Receive Data for SCOM / BIT Interface
Pin 07	Not Connecteed
Pin 08	Not Connected
Pin 09	TXD - Transmit Data for SCOM / BIT Interface

Basic Trouble-shooting

COMMON ERRORS: (This is a generic description of possible issues for a varity of products)
If for some reason there should be something wrong with the picture quality or no picture present, check the symptoms carefully and try to cure it with the hints below:

NO PICTURE / LED BEHAVIOUR:
If there is no light at all in the LED at the FRONT, check power cables. If the LED in front is green then check if the brightness knob is turned to the right (max brightness). If still no picture, check if there is a VGA signal on the External VGA connector. If you have a picture on the external VGA connector please look in BIOS documentation/chapter for correct display settings in BIOS. Lack of image is most likely to be caused by incorrect connection, lack of power, or wrong BIOS settings.

SCROLLING / UNSTABLE IMAGE:
Signal cable may not be completely connected to computer or TFT display. Check the pin assignments and signal timings of the display and your video card with respect to recommended timing and pin assignments. Make sure that the video card is compatible and that it is properly seated / installed on the computer.

DISPLAY AREA IS NOT CENTERED / SIZED CORRECTLY
Make sure that a supported video mode has been selected on the display, or on the video card / system. If it is impossible to position the image correctly, i.e. the image adjustment controls will not move the image far enough, then test it again using another graphics card for the PC system. This situation may occur with a custom graphics card that is not close to standard timings or if something is in the graphics line that may be affecting the signal, such as a signal splitter (please note that normally a signal splitter will not have any adverse effect). If it is impossible to change to the correct resolution/color depth, check if you have the right VGA driver installed in your system.

IMAGE APPEARANCE:
A faulty TFT panel can have black lines, pixel errors, failed sections, flickering or flashing image.
Incorrect graphics card refresh rate, resolution or interlaced mode will probably cause the image to be the wrong size, it may scroll, flicker badly or possibly even no image is present. Sparkling on the display may be a faulty TFT panel signal cable, and it needs service attention.

RGB Signal Only:
Horizontal interference can usually be corrected by adjusting the PHASE (OSD menu).
Vertical interference can usually be corrected by adjusting the FREQUENCY (OSD menu).

HATTELAND®
DISPLAY

Declaration of Conformity

We, manufacturer

Hatteland Display AS
Åmsosen, N-5578 Nedre Vats, Norway

declare under our sole responsibility that the JH MMD, JH MMC, JH STD, JH MIL, HM NMD, HM MIL, HM CMD, HT STD, HD MMD, HM MMD & HT MMC product ranges is in conformity with the following standards in accordance with the EMC Directive.

Low Voltage Directive 2006/95/EC
EN 60950

EMC Directive 2004/108/EC
EN 55022 Class A
EN 55024

Signature:.....
Frode Grindheim
Vice President Product Management
Nedre Vats, Norway

Signature:.....
Arne Kristiansen
Site Manager - Test & Commission Division
Oslo, Norway

CE

CE MARK FIRST AFFIXED DATE (11 March 2010)

IND100237-1

Return Of Goods Information

Return of goods:

(Applies not to warranty/normal service/repair of products)

Hatteland Display referenced as “manufacturer” in this document.

Before returning goods, please contact your system supplier before sending anything directly to manufacturer. When you return products after loan, test, evaulation or products subject for credit, you must ensure that all accessories received from our warehouse is returned. This applies to cables, powermodules and additional equipment except screws or similar, user manual, datasheets or other written paper documents. Furthermore, the product must not have any minor / medium or severe scratches, chemical spills or similar on the backcover, front frame or glass.

This is needed to credit the invoice 100%. Missing parts will not be subject for credit, and you will not get total credit for returned product. You will either be charged separately or the amount is withdrawn from the credit. If you decide to ship the missing items on the after hand, you will get 100% credit for that particular invoice or items received at manufacturer incoming goods control. Please contact our service/sales department if additional questions

Approved packaging methods/materials:

(Applies to all shipments to manufacturer)

When returning goods, please make sure you surround the product with the following material, whenever possible: Original packaging from manufacturer, firm foam material, bubble wrap or lots of PadPack paper or Foam chips/polyester wrapped in sealed plastic bags. In any case, always use a solid cardboard box to surround everything.

Not approved packaging methods/materials are: Foam chips, expanded polyester, clothes, nothing, or too little, or anything that will crumble and get into the ventilation holes of products and cardboard boxes that are not suitable to secure the product during shipment.

Terms Of Sale And Delivery

1) APPLICATION
The terms of sale and delivery apply for Hatteland Display.

2) PRICE

a) The price is per each, if nothing else has been stated, VAT not included. Price is based on the prices from our suppliers, current custom rates, taxes, rate of exchange and international raw material prices. We reserve ourselves the rights to adjustments in case of alternation on the above mentioned.

b) Included in the price is the supplier's standard packing. In case of re-packing/smaller quantities we reserve ourselves the right to add an additional sum for warrantable packing according to CECC 0015 (Basic inspection for protection of electrostatic sensitive devices)

3) VALIDITY
If nothing else has been stated in our quotation, the offer is valid for 30 days from the date of quotation.

4) PACKAGE QUOTATION
A package quotation means that all the components offered, must be ordered by us. If one component or more are removed from the quotation, the prices given in the package quotation are not valid.

5) TERMS OF PAYMENT
Cash on delivery or payment in advance. Net granted for companies, schools and institutions only, according to agreement. In case of too late payment 1.5% interest/month will be charged. Seller has mortage rights in the goods delivered until the purchase price, additional interests and charges have been paid in full. Accepted bill is not considered as payment until it has been honoured in full.

6) TIME OF DELIVERY
The quoted time of delivery is based on information from our suppliers. We disclaim any responsibility for the consequences of any delay or cancellation from our suppliers. Belated delivery gives not solely the right for cancellation.

7) DELIVERY POINT OF TIME
Goods are considered delivered to customer when handed over to charterer.

8) FREIGHT / PACKING / FORWARDING FEE
Hatteland Display AS charge NOK 50,- in forwarding fee for orders below NOK 1000,-.
Freight charge according to expenses for orders above NOK 1000,-. VAT not included.

9) COMPLAINT
By receipt customer must check goods for obvious defects which have to be claimed within 8 days from receipt. Otherwise acceptance of complaint can not be counted on.

10) GUARANTEE / SERVICES
Time of guarantee is calculated from our date of shipment, and applies to the extent that we are covered by our supplier's guarantee regulations. The guarantee does no longer apply if:

I) there has been encroached upon the goods without seller's consent
II) terms of payment is not fulfilled
III) the goods have been damaged due to unskilled treatment
IV) components which are sensitive for static electricity have not been unpacked and treated in a secure way.

Minimum requirements: CECC 00015's standards for handling of such components. The guarantee does not include fair wear and tear.

11) RESPONSIBLITY
Seller undertake to deliver faultless and functional capable goods according to existing technical specifications. Seller disclaim responsibility for any damage or loss which directly or indirectly may be caused due to failure or defect with the delivered goods, if carelessness from the seller can be limited up to the cost of the goods. The supplier's responsibility for defects with the supplied goods do not include secondary damage or loss.

12) CANCELLATION / RETURN
Binding sales contract is concluded when we have confirmed customer's purchase order. Any disagreements in our order confirmation must be reported to seller within 6 days. The agreement can not be altered without our permission, after acceptance from our supplier. If goods are wanted to be returned, a Return No must be assigned from seller. Returned goods without a Return No will not be accepted. By return of stock listed goods, 20% return fee is charged. Returned goods are shipped on customer's account and risk.

13) LOAN, RENT and DEMO
When borrowing of goods for demo/test, the date of return must be added to the document. If no date has been stated, date of return is two weeks from the date of the document. Before return, seller must be contacted for a Return No (RTK). Goods which have been sold with an agreed right of return within stated terms, shall also have a Return No. The Return No must be obtained before the stated date of return. Returned goods without a Return No, or which have not been packed in original packing, will not be accepted.

14) LIMITATIONS
If any of our suppliers claim limited delivery terms towards us, our terms of delivery will be restricted according to those.

15) SOFTWARE
Sold or borrowed software is not allowed to be copied or spread in other ways, without a written permission.

16) RE-EXPORT
Goods delivered from seller may be subject to special rules of exportation in their supplier's native country. Buyer is responsible to obtain necessary permissions for further export/re-sale.

17) QUESTION IN DISPUTE
To settle any dispute the Karmsund Herredsrett is approved the legal venue.

INSTRUCTIONS FOR THE CONSIGNEE

1) CONTROL
Control the goods immediately by receipt. Examine the quantity towards the invoice/packinglist/shipping documents. Look for outward defects on the packing which may indicate damage on or loss of contents. Control the container and the seals for any defects.

2) SECURING EVIDENCE
When defects on the goods have been found, evidence must be secured, and seller must be informed. Call the transporter and point out the defects. Add a description of the defects on the goods receipt, the forwarder's copy of the way-bill or on the driving slip.

3) RESCUE
Bound the damage. Try to restrict the damage and the loss. Seller will compensate expences incurred due to reasonable security efforts in addition to damage and loss.

4) COMPLAINT
Write immediately a complaint to the transporter or his agent. Forward immediately the complaint to the transporter or his agent, and hold the transporter responsible for the defects. The complaint must be sent at the latest:

- for carriage by sea: within 3 days
- for overland / air transportation within 7 days

5) DOCUMENTATION
For any claims the following documentation is required, and must be forwared to the company or their agent: invoice, way-bill and/or bill of landing, and/or statement of arrival, inspection document, besides a copy of the letter of complaint to the transporter.

Pixel Defect Policy

PIXEL DEFECT POLICY

Dot-defects (Bright or dark spots on the panel)

Due to the effect that dot failures are part of the TFT technology such failure occurrence cannot be prevented basically. Even though dot defects usually occur during production process, new defects can appear within the lifespan of a TFT display. Neither the production at LCD-supplier nor the use of a LCD-Monitor after shipment can be influenced by Hatteland Display. Hence Hatteland Display cannot be made responsible for such dot failures. However Hatteland Display understand and accepts the responsibility towards the customers for the delivery of new displays, therefore accepts a limitation on dot defect's occurrence on new displays delivered to the customer.

PRINCIPLES

1. One pixel consists of 3 dots (Red, Green and Blue)

2. Dot defects are differentiated between:
a. Bright dot defects: Spot on the panel appear as pixels or sub pixels that are always lit. Non-extinguishing dot.
b. Dark dot defects: Spot on the panel appear as pixels or sub pixels that are always dark (off). Non-lightening dot.

3. Inspector observes the LCD from normal direction at a distance of 50cm above the worktable.

4. Dark dots are counted under entire white screen.

5. Bright dots are counted under entire black screen.

6. Dot failures within tolerances below are accepted.

REQUIREMENTS

Bright dot	≤ 3 dots
Two adjacent bright dots *	≤ 2
Distance between 2 dot defects *	≥ 5mm
Dark dots	≤ 8
Total number of bright or dark dot defects. *	≤ 8

* 1 or 2 adjacent dot defects considered as 1 defect.

EXTRAORDINARY CIRCUMSTANCES

Possible cases which cannot be influenced either by customer or Hatteland Display.

Examples for extraordinary circumstances:

- Allocation from LCD-Supplier
- Outstanding high number of LCD-panels with bright dots but within LCD-suppliers Specification.
- Sharply increased demand by customer

In such cases a mutual agreement is inevitable.

Examples:

- Acceptance of bright dots in "non-critical" display areas.
- Acceptance of bright dots with defined color.

DOC100293-1 - Rev4 - Feb 2009

Notes

Revision History

Rev.	By	Date	Notes
1	SE DH ML BUL BQ	30 Jun 08	First public release of user manual.
2	SE DH	26 Nov 08	Replaced C3 and C4 with C7 and C8 models (touchscreen) Revised specifications Revised general chapter text
3	SE DH MJL BQ AK	16 Feb 09	Revised jumper settings drawing (Added naming of switches) Replaced typenumbers CF3 and CF4 with CF7 and CF8 due to obsoletion. Revised Contents Of Package chapter (cables, mounting hole ip gasket, frame gasket, screws) Added Mounting Hole IP Gasket and Gasket installation chapters including its technical drawings. Added HM 20T07 CMD drawings and specifications Updated all instances of HM 20T07 NMD drawings and illustrations from front. Revised minor text changes on specifications page.
4	SE PL	17 Feb 2009	Revised handle release drawings. 1 locking pin instead of 2. Minor text changes on specification pages.
5	SE AK PL	19 Mar 2009	Revised “Declaration of Conformity” certificate. Revised specifications regarding operating temperature DC
6	KEO SE	03 Sep 2009	Removed references to “Flicker Compensation”. (page 35, 38,39) Revised Operating Temperature from 40 to 55 (page 38,39)
7	PT SE	15 Apr 2010	Changed serial cable text and graphics only from “male-male” to “male-female”. Cable shipped with product is “male-female” (page 6)
8	BQ SE	31 Mar 2011	Revised Contents of Package (Documentation and Driver DVD/User Manual) (page 5) Revised company related (page 1, 8) Added Nato Stock Number for products (page 38,39)
9	LV BU JE SE	29 Sep 2011	Revised Contents of package (cable length 30cm / 0.98ft for VSD100641-1) (page 5) Revised General company text (page 10) Revised Installation and mounting (point 9 added) (page 14) Revised General mounting instructions (point 9 added) (page 15)